SOIL SURVEY OF

Desha County, Arkansas

United States Department of Agriculture
Soil Conservation Service
In cooperation with
Arkansas Agricultural Experiment Station

Issued March 1972

Major fieldwork for this soil survey was done in the period 1956–66. Soil names and descriptions were approved in 1968. Unless otherwise indicated, statements in this publication refer to conditions in the county in 1967. This survey was made cooperatively by the Soil Conservation Service and the Arkansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Desha County Conservation District and Phillips County Soil and Water Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Desha County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the capability unit in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units.

Foresters and others can refer to the section "Use of the Soils for Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Use of the Soils for Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for homes, industrial buildings, and recreation areas in the section "Nonfarm Uses of the Soils."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation, Classification, and Morphology of the Soils."

Newcomers in Desha County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County."

Cover picture.—Hill-dropped cotton on Rilla silt loam, 0 to 1 percent slopes.

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SOIL SURVEY OF DESHA COUNTY, ARKANSAS

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE ARKANSAS AGRICULTURAL EXPERIMENT STATION

DESHA COUNTY, in the southeastern part of Arkansas (fig. 1), is very irregular in shape. It is about 36 miles from north to south and about 28 miles from east to west. The county has a total area of 515,200 acres, of which nearly 10 percent is water.

The soils of the county formed in alluvium deposited by the Arkansas, Mississippi, and White Rivers. They are level to gently undulating. Most of the soils contain moderate to large amounts of plant nutrients. There is an abundant supply of ground water, and there is an almost unlimited supply of surface water in the many natural lakes and the three major rivers that have their confluence in the eastern part of the county.

The total rainfall is sufficient for most crops, but the distribution of rainfall throughout the year is not always favorable. In summer, the rainfall is generally limited, and most crops benefit from irrigation. In winter and spring, most soils are saturated and need drainage for efficient farming and to improve the environment for the inhabitants.

Cotton, soybeans, and rice are the principal crops. The acreage of winter small grain, such as wheat, is increasing, and a small acreage is in permanent pasture. Acreage controls on cotton and rice, the shortage of labor, improved varieties, mechanization, and continued high prices have encouraged the trend toward clearing large tracts of woodland and toward growing more soybeans. Mechanization and chemical weed control have largely offset a shortage of labor caused by migration of laborers from farms to urban centers.

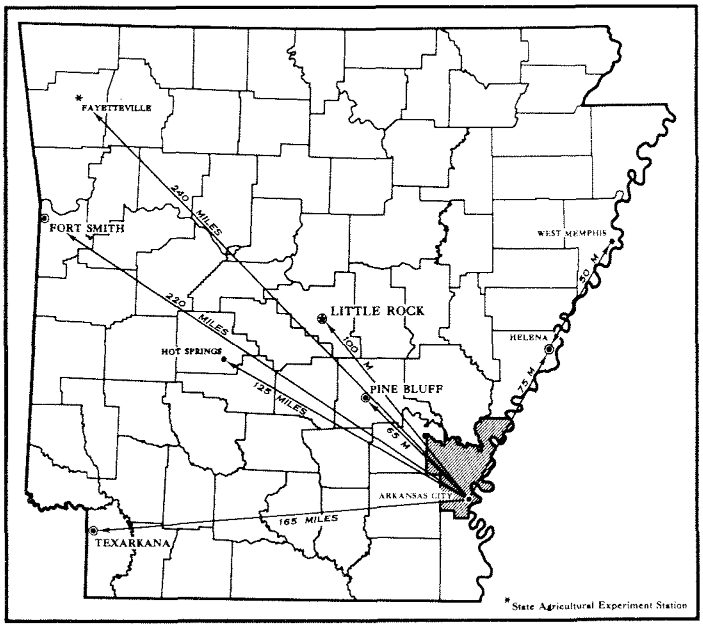

Figure 1.—Location of Desha County in Arkansas.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Desha County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey (*7*)[1].

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Desha and McGehee, for example, are the names of two soil series. All the soils in the United States having the same series

[1] Italic numbers in parentheses refer to Literature cited, page 47.

name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Rilla silt loam, 0 to 1 percent slopes, is one of two phases of the Rilla series in this county.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

A comparison of the detailed soil map of this county with that of adjoining areas of Chicot County and of Bolivar County, Mississippi, will show a few places where soil boundaries do not match perfectly at county lines. These few differences arise because continuing refinement of the soil classification system has resulted in some changes in classification by soil series.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. Three such kinds of mapping units are shown on the soil map of Desha County: soil complexes, soil associations, and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soil or soils. Coushatta complex, 0 to 1 percent slopes, is an example. If there are two or more dominant soils, the names are joined by a hyphen.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map but are shown as one unit because the time and effort of delineating them separately cannot be justified. There is a considerable degree of uniformity in pattern and relative extent of the dominant soils, but the soils may differ greatly one from another. The name of an association consists of the names of the dominant soils, joined by a hyphen. Sharkey-Commerce-Coushatta association, frequently flooded, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Sharkey and Desha clays, gently undulating, is an example.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others; then they adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this publication shows, in color, the soil associations in Desha County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, texture, drainage, and other characteristics that affect their management.

The five soil associations in Desha County are discussed in the following pages.

1. Perry-Portland-Hebert association

Level and gently undulating, poorly drained and somewhat poorly drained, clayey and loamy soils

This association is along the western side of the county near Bayou Bartholomew. It consists of soils on broad flats broken by undulating areas, which occur as shallow depressions separated by low ridges. The ridges are 3 to 5 feet higher than the depressions.

This association makes up about 5.8 percent of the county. Perry soils make up about 60 percent of the association; Portland soils, 15 percent; Hebert soils, 15 percent; and McGehee, Sharkey, Desha, and Tutwiler soils make up the rest.

Perry soils are poorly drained. They have a surface layer of grayish-brown to dark-gray silt loam or clay. The subsoil is dark-gray or gray, mottled clay. Below this is red to reddish-brown clay or silty clay.

Portland soils are somewhat poorly drained. They have a surface layer of grayish-brown to dark-brown silt loam or clay. The subsoil is brown to reddish-brown, mottled clay. Below this is variegated shades of red and brown clay to clay loam.

Hebert soils are somewhat poorly drained. They have a surface layer of very dark grayish-brown to brown silt loam. The subsoil is brown or grayish-brown, mottled silt loam or silty clay loam. Below this is brown to reddish-brown mottled silt loam to fine sandy loam.

Excess water is a moderate to severe hazard, but most of the acreage is cultivated. There are a few small areas of pasture and hardwood timber. The main crops are soybeans, rice, cotton, and small grain. Farms average about 450 acres in size. Most are highly mechanized and owner operated. A few farms are rented.

This association has moderate to severe limitations for most nonfarm uses. The clayey soils shrink and crack when dry; they expand and seal over when wet. Thus, they have low bearing strength, are unstable, and are poorly suited as a base for structures.

2. *Hebert-Rilla-McGehee association*

Level and nearly level, somewhat poorly drained and well-drained, loamy soils

This association is in the western part of the county. It consists of soils on natural levees, mainly along the Arkansas River, Red Fork Bayou, Amos Bayou, Bayou Macon, Bayou Bartholomew, and their abandoned channels. The soils are on long, narrow, gentle rises. Rilla soils are on the crests and side slopes, and Hebert and McGehee soils are on the lower parts.

This association makes up about 18.9 percent of the county. Hebert soils make up about 35 percent of the association; Rilla soils, 30 percent; McGehee soils, 15 percent; and Tutwiler, Coushatta, Sharkey, and Desha soils make up the rest.

Hebert soils are somewhat poorly drained. They have a surface layer of very dark grayish-brown to brown silt loam. The subsoil is dark-brown to grayish-brown, mottled silt loam or silty clay loam. Below this is brown to reddish-brown, mottled silt loam to fine sandy loam.

Rilla soils are well drained. They have a surface layer of brown or dark-brown silt loam. The subsoil is yellowish-red or reddish-brown silt loam or silty clay loam. Below this is brown to red silty clay loam to fine sandy loam.

McGehee soils are somewhat poorly drained. They have a surface layer of dark grayish-brown to brown silt loam. The upper part of the subsoil is grayish-brown to reddish-brown, mottled silty clay loam. Below this is dark grayish-brown to dark reddish-brown, mottled silty clay or clay.

This association is one of the major cotton and soybean producing areas of the county. Excess water is a moderate hazard on Hebert and McGehee soils; erosion is a slight to moderate hazard on sloping areas of Rilla soils. Otherwise, the association is well suited to farming, and nearly all the acreage is cultivated. Farming is diversified; cotton, soybeans, and small grain are the major crops. Farms average about 450 acres in size. Most are highly mechanized. About half are rented.

This association has moderate to severe limitations for most nonfarm uses.

3. *Sharkey-Commerce-Coushatta association*

Level and gently undulating, poorly drained to well-drained, clayey and loamy soils

This association consists of soils on broad flats broken by undulating areas, which are characterized by long, narrow depressions separated by ridges. The ridges are 2 to 4 feet higher than the depressions. Most of the association is behind levees along the Arkansas and Mississippi Rivers and is subject to frequent flooding.

This association makes up about 23.8 percent of the county. It includes about 38,500 acres of borrow pits, levees, rivers, and oxbow lakes. Sharkey soils make up about 40 percent of the association; Commerce soils, 30 percent; Coushatta soils, 20 percent; and Newellton, Bruno, and Tunica soils make up the rest.

Sharkey soils are poorly drained. They have a surface layer of gray to very dark grayish-brown clay or silt loam. The subsoil is gray or dark-gray mottled clay. Below this is gray to reddish-brown, mottled clay.

Commerce soils are somewhat poorly drained. They have a surface layer of brown to dark grayish-brown silt loam. The subsoil is grayish-brown or dark grayish-brown, mottled silt loam or silty clay loam. Below this is grayish-brown to dark-gray, mottled silt loam or silty clay loam.

Coushatta soils are well drained. They have a surface layer of brown or dark-brown silt loam or silty clay loam. The subsoil is reddish-brown or dark reddish-brown silt loam or silty clay loam overlying thinly stratified, dark-brown to strong-brown sandy loam to silty clay loam.

Most of this association is subject to frequent flooding and is better suited to woodland (fig. 2) and wildlife than to crops. About 95 percent of the frequently flooded area is in hardwood forest, and about 5 percent is in crops and pasture. Most of the small part that is protected by levees is used for crops, chiefly cotton and soybeans.

Most soils of this association have a severe limitation for dwellings, septic tank filter fields, and industries because of the frequent flooding. The part that is protected by levees consists chiefly of Commerce soils, which have moderate limitations for most nonfarm uses. The clayey soils in this association shrink and crack when dry; they expand and seal over when wet. Thus, they have low bearing strength, are unstable, and are poorly suited as a base for structures.

***Figure 2.*—Hardwood forest on Sharkey clay, in an area of the Sharkey-Commerce-Coushatta association. Most of this association is used for woodland.**

4. Sharkey-Desha association

Level and gently undulating, poorly drained and somewhat poorly drained, predominantly clayey soils

This association is in broad areas throughout the county south of the mouth of the White River. It consists of soils on broad flats broken by undulating areas. The undulating areas are characterized by narrow depressions separated by ridges that are 3 to 5 feet high.

This association makes up about 38.8 percent of the county, including about 20,000 acres of levees, rivers, and oxbow lakes. Sharkey soils make up about 45 percent of the association; Desha soils, 40 percent; and Hebert, McGehee, Portland, Perry, and Coushatta soils make up the rest.

Sharkey soils are poorly drained. They have a surface layer of gray to very dark grayish-brown clay or silt loam. The subsoil is gray or dark-gray, mottled clay. Below this is gray to reddish-brown, mottled clay.

Desha soils are somewhat poorly drained. They have a surface layer of dark-brown or dark reddish-brown clay or silt loam. The upper part of the subsoil is dark-brown to dark reddish-brown clay overlying reddish-brown to brown clay that is mottled throughout. Below this is brown, mottled clay.

Where it is protected from flooding, this association is one of the major rice and soybean producing areas of the county. Excess water is a severe hazard, and intensive surface drainage is required for regular production of crops. Most of the protected area is cultivated, but there are some large areas of hardwood forest and a few small areas of pasture. The major crops are rice, soybeans, and small grain. Farms average about 500 acres in size, and most are highly mechanized. About 60 percent are owner operated, and the rest are rented.

This association has severe limitations for most nonfarm uses. The areas unprotected by levees are subject to frequent flooding. The clayey soils in this association shrink and crack when dry; they expand and seal over when wet. Thus, they have low bearing strength, are unstable, and are poorly suited as a base for structures.

5. Sharkey association

Level and gently undulating, poorly drained, predominantly clayey soils

This association occurs north of the White River. It consists of broad flats broken by undulating areas, which are characterized by narrow depressions separated by ridges 3 to 5 feet high.

This association, which includes a large part of the White River National Wildlife Refuge, makes up about 12.7 percent of the county. Sharkey soils make up about 75 percent of the association; Newellton, Tunica, Bruno, and Commerce soils make up the rest.

Sharkey soils are poorly drained. They have a surface layer of gray to very dark grayish-brown clay or silt loam. The subsoil is gray or dark-gray, mottled clay. Below this is gray to reddish-brown, mottled clay.

Where it is protected from flooding, most of this association is cultivated. Excess water is a severe hazard, and intensive surface drainage is required for regular production of crops. There are some large areas of hardwood forest and a few small areas of pasture. The major crops are cotton and soybeans. Farms average about 500 acres in size, and most are highly mechanized. About 60 percent are owner operated, and the rest are rented.

This association has severe limitations for most nonfarm uses. The areas unprotected by levees are subject to frequent flooding. The clayey soils in this association shrink and crack when dry; they expand and seal over when wet. Thus, they have low bearing strength, are unstable, and are poorly suited as a base for structures.

Descriptions of the Soils

In this section the soils of Desha County are described in detail. The procedure is to describe first the soil series and then the mapping units in that series. Thus, to get full information on any one mapping unit, it is necessary to read both the description of that unit and the description of the soil series to which the unit belongs.

In the pages that follow, a general description of each soil series is given. Each series description has a short narrative description of a representative profile and a much more detailed description of the same profile that scientists, engineers, and others can use in making highly technical interpretations. Following the profile is a brief statement of the range in characteristics of the soils in the series, as mapped in this county. If the profile of a given mapping unit differs from this typical profile, the differences are stated in the description of the mapping unit, unless they are apparent from the name of the mapping unit. Many of the terms used in describing soil series and mapping units are defined in the Glossary, and some are defined in the section "How This Survey Was Made."

The approximate acreage and proportionate extent of the soils are shown in table 1. The "Guide to Mapping Units," at the back of this survey, lists all the mapping

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Bowdre, Desha, and Robinsonville soils, gently undulating	1, 327	0. 3
Bruno loamy sand, gently undulating	2, 307	. 4
Commerce silt loam, 0 to 1 percent slopes	4, 829	. 9
Commerce silt loam, gently undulating	1, 014	. 2
Coushatta complex, 0 to 1 percent slopes	3, 860	. 7
Desha silt loam	2, 996	. 6
Desha clay	30, 381	5. 9
Hebert silt loam	39, 025	7. 6
McGehee silt loam	14, 757	2. 8
Newellton clay, 0 to 1 percent slopes	4, 896	1. 0
Newellton clay, gently undulating	3, 125	. 6
Perry silt loam	379	. 1
Perry clay	18, 607	3. 6
Portland silt loam	2, 272	. 4
Portland clay	3, 586	. 7
Rilla silt loam, 0 to 1 percent slopes	21, 704	4. 2
Rilla silt loam, 1 to 3 percent slopes	7, 638	1. 5
Sharkey clay	59, 208	11. 5
Sharkey-Commerce-Coushatta association, frequently flooded	73, 119	14. 2
Sharkey and Desha silt loams	4, 358	. 9
Sharkey and Desha clays, 0 to 1 percent slopes	130, 730	25. 3
Sharkey and Desha clays, gently undulating	9, 910	1. 9
Tunica clay, 0 to 1 percent slopes	1, 830	. 3
Tunica clay, 1 to 3 percent slopes	1, 874	. 3
Tunica clay, frequently flooded	2, 953	. 6
Tutwiler silt loam	6, 871	1. 5
Borrow pits	6, 633	1. 3
Levees	3, 614	. 7
Water	51, 397	10. 0
Total	515, 200	100. 0

units of the county. It also shows the capability unit and woodland group for each mapping unit and the page where the capability unit and the woodland group are described.

Bowdre Series

The Bowdre series consists of somewhat poorly drained, slowly permeable soils in gently undulating slack-water areas. These soils formed in thin beds of clayey sediments and the underlying loamy sediments. The slope ranges from 0 to 3 percent.

In a typical profile the surface layer is very dark grayish-brown silty clay. The upper part of the subsoil is very dark grayish-brown, mottled clay; the lower part is brown silt loam to fine sandy loam.

Bowdre soils are associated with the somewhat poorly drained Desha soils and the well-drained Robinsonville soils. They are browner and coarser textured in the lower part of the subsoil than Desha soils. They have a darker colored, finer textured surface layer than Robinsonville soils.

In Desha County, Bowdre soils are mapped only as part of an undifferentiated group with Desha and Robinsonville soils.

Typical profile of Bowdre silty clay, gently undulating, in a moist cultivated field, in the SE¼SE¼SE¼ sec. 9, R. 2 W., T. 9 S.

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) silty clay; moderate, fine, granular structure; firm, plastic; many fine roots; neutral; clear, smooth boundary.

B2—5 to 18 inches, very dark grayish-brown (10YR 3/2) clay; few, fine, faint, dark yellowish-brown mottles; moderate, medium, subangular blocky structure; firm, plastic; many fine roots; neutral; clear, smooth boundary.

IIB3—18 to 30 inches, brown (7.5YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; many bedding planes; many fine roots; neutral; clear, smooth boundary.

IIC—30 to 50 inches, brown (7.5YR 5/4) fine sandy loam; massive; common bedding planes; friable; few fine roots; mildly alkaline.

The combined thickness of the silty clay and clay horizons ranges from 12 to 20 inches. The IIB3 and IIC horizons are brown silt loam to fine sandy loam that have common to many bedding planes. Reaction ranges from slightly acid to mildly alkaline throughout the profile.

Bowdre, Desha, and Robinsonville soils, gently undulating (BdU).—In this undifferentiated group Bowdre soils make up about 40 percent of the acreage; Desha soils, 25 percent; and Robinsonville soils, 20 percent. The soil material has been reworked by floodwater. The soils occupy undulating ridges that have no regular pattern of length, width, or direction on the landscape. In some areas, Bowdre soils are on ridges and Desha soils are in swales; in others, Robinsonville soils are on ridges and Bowdre soils are in swales. The slope ranges from 0 to 3 percent. Included in mapping were spots of Bruno, Coushatta, and Portland soils.

Bowdre soils are somewhat poorly drained. They have a surface layer of very dark grayish-brown silty clay or clay about 5 inches thick. The upper part of the subsoil is very dark grayish-brown silty clay or clay mottled with dark yellowish brown; the lower part is brown silt loam to fine sandy loam.

Desha soils are somewhat poorly drained. They have a surface layer of dark-brown to dark reddish-brown clay. The upper part of the subsoil is dark-brown to dark reddish-brown clay, and the lower part is reddish-brown clay. The subsoil is mottled throughout with gray, brown, and red.

Robinsonville soils are well drained. They have a surface layer of dark-brown or brown silt loam. Below this is a layer of brown or light-brown silt loam to sandy loam.

Runoff is slow, and permeability is very slow to moderate. The available water capacity is high. Reaction is slightly acid to mildly alkaline. Natural fertility is moderate to high.

These soils are suited to cultivated crops. Farming operations may be delayed for a few days after a rain because water accumulates in swales. Tilth is easy to maintain on Robinsonville soils, but difficult on the others. (Bowdre part in capability unit IIIw–1; woodland group 2w5. Desha part in capability unit IIIw–1; woodland group 2w6. Robinsonville part in capability unit IIe–1; woodland group 1o4)

Bruno Series

The Bruno series consists of excessively drained, moderately rapidly permeable soils along rivers and near levee crevasses. These soils formed in stratified, coarse-textured sediments deposited by rapidly flowing water. The areas are gently undulating. The slope ranges from 0 to 3 percent.

In a typical profile the surface layer is dark grayish-brown loamy sand. The material below this is pale-brown sand that contains thin lenses of fine sandy loam to silty clay. Below this is brown to reddish-brown silt loam, which is underlain by dark reddish-brown silty clay.

Bruno soils are associated with the well-drained Coushatta and Tutwiler soils, the somewhat poorly drained Commerce soils, and the poorly drained Sharkey soils. They have a coarser texture than those soils.

Typical profile of Bruno loamy sand, gently undulating, in a moist pasture in the NE¼NE¼NW¼ sec. 8, T. 9 S., R. 2 W.

Ap—0 to 5 inches, dark grayish-brown (10YR 4/2) loamy sand; structureless; loose; many fine roots; slightly acid; clear, smooth boundary.

C1—5 to 16 inches, pale-brown (10YR 6/3) sand; structureless; loose; many fine roots; slightly acid; gradual, wavy boundary.

C2—16 to 28 inches, pale-brown (10YR 6/3) sand; structureless; loose; common thin lenses of fine sandy loam to silty clay and many bedding planes; few fine roots; slightly acid; abrupt, smooth boundary.

C3—28 to 38 inches, reddish-brown (5YR 4/4) silt loam; massive; friable; common bedding planes and thin lenses of very fine sandy loam; few fine roots; abundant fine pores; slightly acid; clear, wavy boundary.

C4—38 to 49 inches, reddish-brown (5YR 4/3) silt loam; massive; friable; few fine roots and pores; small pockets of silt; slightly acid; gradual, wavy boundary.

C5—49 to 53 inches, dark-brown (7.5YR 4/4) silt loam; massive; friable; common bedding planes; few fine roots; few fine pores; slightly acid; clear, wavy boundary.

C6—53 to 64 inches, brown (7.5YR 5/4) silt loam that contains lenses of dark reddish-brown (5YR 3/3) silty clay loam; massive; friable; many bedding planes; few fine roots; few fine pores; neutral; gradual, wavy boundary.

C7—64 to 72 inches, dark reddish-brown (5YR 3/3) silty clay that contains lenses of dark-brown (7.5YR 4/4) silt loam; massive; firm; neutral.

The A horizon is dark grayish brown to brown. The C1 and C2 horizons are pale brown or light yellowish brown in color and sand to loamy fine sand in texture. The depth to the C3 horizon ranges from about 26 to 45 inches. The C3 and C4 horizons range from reddish brown to brown in color and from fine sandy loam to silt loam in texture. Reaction ranges from medium acid to mildly alkaline throughout the profile.

Bruno loamy sand, gently undulating (BrU).—This soil occupies low, parallel ridges and swales. The ridges are 1 to 3 feet high, 100 to 200 feet wide, and ⅛ to ½ mile long. Between the ridges are swales that are 25 to 75 feet wide.

The surface layer is dark grayish-brown to brown loamy sand 5 inches thick. Below this is pale-brown to light yellowish-brown sand to loamy fine sand that contains thin lenses of fine sandy loam to silty clay. Brown to reddish-brown silt loam to fine sandy loam begins at a depth ranging from about 26 to 45 inches. This layer is underlain by gray to dark reddish-brown silty clay or clay.

Included in mapping were a few spots of Commerce, Coushatta, and Tutwiler soils.

Runoff is very slow, and permeability is moderate. The available water capacity is low. Reaction is medium acid to mildly alkaline. Natural fertility is low.

This soil is droughty and is poorly suited to most crops. Pasture (fig. 3), hay crops, and winter small grain are fairly well suited. Tilth is easy to maintain. (Capability unit IIIs-1; woodland group 2s5)

Commerce Series

The Commerce series consists of somewhat poorly drained, moderately slowly permeable soils. These soils formed in beds of stratified loamy alluvium on natural levees. They are level or gently undulating. The slope ranges from 0 to 3 percent.

In a typical profile the surface layer is dark grayish-brown silt loam. The subsoil is dark grayish-brown, mottled silt loam or silty clay loam. Below this is grayish-brown to dark-gray, mottled silt loam or silty clay loam.

Commerce soils are associated with the excessively drained Bruno soils, the well-drained Coushatta soils, the somewhat poorly drained Newellton soils, and the poorly drained Sharkey soils. They are finer textured and less friable than Bruno soils. Commerce soils have a coarser textured surface layer than Newellton soils and are less gray in the subsoil than those soils. They are grayer than Coushatta soils and are coarser textured and not so gray as Sharkey soils.

Typical profile of Commerce silt loam, 0 to 1 percent slopes, in a moist cultivated field in the NW¼SW¼NW¼ sec. 7, T. 7 S., R. 2 E.

Ap1—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silt loam; weak, fine, subangular blocky structure; friable; few fine pores; few fine roots; neutral; clear, smooth boundary.

Ap2—8 to 14 inches, dark grayish-brown (2.5Y 4/2) silt loam; few, medium, faint, grayish-brown (2.5Y 5/2) mottles; massive to weak, thin, platy structure; compact but friable; few fine pores; few fine roots; neutral; clear, wavy boundary.

B21—14 to 22 inches, dark grayish-brown (10YR 4/2) silt loam; common, medium, faint, dark-gray (10YR 4/1) and distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; friable; plentiful fine pores; few fine roots; neutral; gradual, wavy boundary.

B22—22 to 34 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, faint, dark-gray and distinct, yellowish-brown mottles; weak, fine, subangular blocky structure; friable; common fine pores; few fine roots; mildly alkaline; clear, wavy boundary.

Figure 3.—**Bermudagrass pasture on Bruno loamy sand, gently undulating. Pasture is better suited to this soil than cotton and soybeans.**

B23—34 to 39 inches, dark grayish-brown (10YR 4/2) silt loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; common fine pores; very few fine roots; mildly alkaline; gradual, wavy boundary.

C1—39 to 55 inches, dark grayish-brown (10YR 4/2) silt loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) and faint, dark-gray (10YR 4/1) mottles; massive; friable; common fine pores; moderately alkaline; gradual, wavy boundary.

C2—55 to 68 inches, dark-gray (10YR 4/1) silt loam; few, medium, distinct, dark-brown (10YR 3/3) and yellowish-brown (10YR 5/6) mottles; massive; friable; few fine pores; moderately alkaline; gradual, wavy boundary.

Ab—68 to 72 inches, very dark gray (10YR 3/1) silt loam; few, medium, distinct, dark-brown (10YR 3/3) mottles; massive; friable; mildly alkaline.

The A horizon ranges from brown to dark grayish brown in color. The B horizon is grayish-brown or dark grayish-brown silt loam or silty clay loam that has few to common, faint or distinct mottles in shades of gray and brown. The C horizon is silt loam or silty clay loam. It ranges from grayish brown to dark gray in color and has few to common, fine to medium, faint or distinct mottles in shades of gray and brown. A buried A horizon below a depth of 50 inches interrupts the C horizon of many profiles.

Reaction is slightly acid to neutral in the A horizon and neutral to moderately alkaline in the B and C horizons.

Commerce silt loam, 0 to 1 percent slopes (CmA).—This soil has the profile described as representative of the series. The surface layer consists of brown to dark grayish-brown silt loam 14 inches thick. The subsoil is grayish-brown or dark grayish-brown silt loam or silty clay loam mottled with gray and brown. Below this is grayish-brown to dark-gray, mottled silt loam or silty clay loam.

Included in mapping were a few areas where the surface layer is fine sandy loam, as well as spots of Bruno and Newellton soils.

Surface runoff is slow, and permeability is moderately slow. The available water capacity is high. Reaction is slightly acid to neutral in the surface layer and neutral to moderately alkaline in the subsoil. Natural fertility is high.

This soil is well suited to crops (fig. 4) if it is protected from flooding. It warms up early in spring, and crops can be planted early. Tilth is easy to maintain. (Capability unit I–1, Vw–1 in frequently flooded areas; woodland group 1w5)

Commerce silt loam, gently undulating (CmU).—This soil occupies low, parallel ridges and swales. The ridges are 1 to 4 feet high, 100 to 300 feet wide, and 1/8 to 3/4 mile long. Between the ridges are swales 25 to 75 feet wide.

The surface layer consists of brown to dark grayish-brown silt loam 6 to 10 inches thick. The subsoil is grayish-brown to dark grayish-brown silt loam or silty clay loam mottled with gray and brown. Below this is grayish-brown to dark-gray, mottled silt loam or silty clay loam.

Included in mapping were a few areas where the surface layer is fine sandy loam, and a few spots of Bruno and Newellton soils.

Surface runoff is slow in the swales and medium on the ridges. Permeability is moderately slow. The available water capacity is high. Reaction is slightly acid to neutral in the surface layer and neutral to moderately alkaline in the subsoil. Natural fertility is high.

This soil is well suited to crops if it is protected from flooding. It warms up early in spring, and crops can be planted early. Tilth is easy to maintain. (Capability unit IIe–1, Vw–1 in frequently flooded areas; woodland group 1w5)

Coushatta Series

The Coushatta series consists of well-drained, moderately slowly permeable, level soils on natural levees. These soils formed in stratified, loamy sediments.

In a typical profile the surface layer is dark-brown silty clay loam and the subsoil is reddish-brown and dark reddish-brown silty clay loam. Below is thinly stratified, dark-brown to strong-brown silt loam.

Coushatta soils are associated with the excessively drained Bruno soils, the somewhat poorly drained Commerce and Desha soils, and the poorly drained Sharkey soils. Coushatta soils are redder throughout than Bruno, Commerce, and Sharkey soils. They are finer textured than Bruno soils, but coarser textured than Desha and Sharkey soils.

Typical profile of Coushatta silty clay loam, in a moist cultivated area (Coushatta complex, 0 to 1 percent slopes) in the SE1/4SE1/4SE1/4 sec. 6, T. 9 S., R. 2 W.

Ap—0 to 5 inches, dark-brown (7.5YR 4/4) silty clay loam; moderate, medium, granular structure; friable; many fine roots; slightly acid; abrupt, smooth boundary.

B21—5 to 14 inches, dark reddish-brown (5YR 3/3) silty clay loam; moderate, medium, subangular blocky structure; firm; many fine roots; few, fine, dark-brown concretions; neutral; clear, smooth boundary.

B22—14 to 23 inches, reddish-brown (5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; many fine roots; many fine pores; few, fine, black concretions; neutral; gradual, smooth boundary.

C1—23 to 31 inches, dark-brown (7.5YR 4/4) silt loam that has a few, fine, faint, brown mottles; massive; firm; few fine roots; few fine pores; few, fine, black concretions; neutral; clear, smooth boundary.

C2—31 to 67 inches, brown (7.5YR 5/4) silt loam that has a few thin lenses, 1/8 to 1/4 inch thick, of dark-brown (7.5YR 4/4) silty clay loam to loam; massive; friable; many bedding planes; few fine roots; neutral; abrupt, smooth boundary.

C3—67 to 80 inches, brown (7.5YR 5/4) silt loam that has lenses, 1/2 to 1 inch thick, of dark-brown (7.5YR 3/2) silty clay loam and streaks and splotches of contrasting shades of brown; massive; firm; many bedding planes; mildly alkaline.

The A horizon is brown or dark brown in color and silt loam or silty clay loam in texture. The B horizon is dark reddish-brown or reddish-brown silty clay loam or silt loam. The C horizon is dark-brown to strong-brown sandy loam to silty clay loam. This horizon is commonly thinly stratified and has many bedding planes. The reaction is slightly acid to mildly alkaline throughout the profile.

Coushatta complex, 0 to 1 percent slopes (CoA).—The soils in this complex have a profile similar to that described as representative of the series. They are mostly well drained, but there are some small areas of excessively drained or somewhat poorly drained soils. Coushatta soils make up about 70 percent of the acreage; Desha, Bruno, and Bowdre soils each make up 5 to 15 percent; and inclusions of other soils make up 5 to 15 percent.

Coushatta soils have a surface layer of dark-brown to brown silt loam or silty clay loam 5 inches thick. The

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Figure 4.—**Soybeans on Commerce silt loam, 0 to 1 percent slopes. Most of this soil is well suited to crops.**

subsoil is reddish-brown or dark reddish-brown silt loam or silty clay loam that overlies dark-brown to strong-brown, thinly stratified sandy loam to silty clay loam.

Desha soils have a surface layer of dark-brown to dark reddish-brown clay or silt loam. The upper part of the subsoil is dark-brown or dark reddish-brown clay, and the lower part is reddish-brown or brown clay. The subsoil is mottled throughout with gray, brown, and red.

Bruno soils have a surface layer of brown to dark grayish-brown loamy sand. The material below is pale-brown to light yellowish-brown sand to loamy fine sand that has thin lenses of fine sandy loam to silty clay. Below this material is brown to reddish-brown silt loam or fine sandy loam, which is underlain by gray to dark reddish-brown silty clay or clay.

Bowdre soils have a surface layer of very dark grayish-brown silty clay or clay. The upper part of the subsoil is very dark grayish-brown silty clay or clay mottled with yellowish brown. The lower part is brown silt loam to fine sandy loam.

Runoff is slow, and permeability ranges from very slow in Desha soils to moderate in Bruno soils. The available water capacity is high in most of the complex, but it is low in the Bruno soils. The reaction is slightly acid to mildly alkaline except in the Bruno soils, where it is medium acid. Natural fertility is low in the Bruno soils, but it is high in the others.

Generally, this complex is well suited to crops. Tilth is easy to maintain on the loamy and sandy soils, but difficult on the clayey soils. Planting is commonly delayed in spring because of the spots of somewhat poorly drained soils. (Capability unit I–1; woodland group 1o4)

Desha Series

The Desha series consists of somewhat poorly drained, very slowly permeable soils on broad flats. These soils formed mainly in thick beds of fine-textured, slack-water deposits from the Arkansas River. Most areas are level, but some are gently undulating.

In a typical profile the surface layer is dark reddish-brown clay. The upper part of the subsoil is dark reddish-brown, mottled clay, and the lower part is reddish-brown, mottled clay. Below this is brown, mottled clay.

Desha soils are associated with the somewhat poorly drained Bowdre and McGehee soils, the well-drained Robinsonville soils, and the poorly drained Sharkey soils. They are redder than the associated soils. Desha soils are finer textured in the uppermost part of the subsoil than McGehee soils. They are finer textured throughout than Robinsonville soils, and finer textured in the lower part of the subsoil than Bowdre soils.

Typical profile of Desha clay in a moist cultivated area, in the NW¼NE¼NW¼ sec. 16, T. 9 S., R. 3 W.

Ap—0 to 7 inches, dark reddish-brown (5YR 3/2) clay; moderate, fine, subangular blocky structure; firm, plastic; many fine roots; neutral; abrupt, smooth boundary.

B1—7 to 28 inches, dark reddish-brown (5YR 3/2) clay; few, fine, faint, brown mottles; moderate, medium, subangular blocky structure; firm, plastic; peds have pressure faces on all sides; few slickensides; few fine roots; many, fine, black concretions; neutral; clear, wavy boundary.

B2—28 to 44 inches, reddish-brown (5YR 4/4) clay; common, fine, faint, yellowish-red and brown mottles; moderate, medium, subangular blocky structure; firm, plastic; peds have many pressure faces; few slickensides; few fine roots; few, fine, black concretions; neutral; gradual, smooth boundary.

B3—44 to 55 inches, reddish-brown (5YR 4/3) clay; few, fine, faint, yellowish-red mottles; moderate, medium, subangular blocky structure; firm, plastic; peds have common pressure faces; few fine roots; few, fine, black concretions; neutral; gradual, wavy boundary.

C—55 to 72 inches, brown (7.5YR 4/4) clay that has few, fine, faint, strong-brown mottles and distinct, gray mottles; massive; firm, plastic; few, fine, black concretions; mildly alkaline.

The A1 or Ap horizon is dark-brown or dark reddish-brown silt loam or clay. The B1 horizon is dark brown or dark reddish brown. The B2 horizon is dark brown to reddish brown. The B3 horizon is reddish brown or brown. The B horizon has few to common mottles of gray, brown, and red. Some profiles have a IIC horizon of red to reddish-brown, calcareous sandy clay loam to fine sandy loam.

Reaction is neutral to slightly acid in the A horizon and neutral to mildly alkaline in the B and C horizons.

Desha silt loam (De).—This soil formed in a thin layer of silty sediments and the underlying thick beds of clay. It has a surface layer of dark-brown or dark reddish-brown silt loam 5 to 8 inches thick. The upper part of the subsoil is dark-brown or dark reddish-brown clay, and the lower part is brown or reddish-brown clay. The subsoil is mottled throughout with gray, brown, and red. A few areas are underlain by red to reddish-brown, calcareous sandy clay loam to fine sandy loam.

Included in mapping were a few small areas of fine sandy loam or clay and a few spots of Portland, Perry, and Sharkey soils.

When it is dry, cracks form in the subsoil. Permeability is moderately slow in the surface layer and very slow below. Runoff is very slow, and excess water is a severe hazard. Reaction is neutral or slightly acid in the surface layer and neutral to mildly alkaline below. Natural fertility is high.

In undrained areas farming operations commonly are delayed several days after a rain. Tilth is easy to maintain. (Capability unit IIIw–1, Vw–1 in frequently flooded areas; woodland group 2w6)

Desha clay (Dh).—This soil has the profile described as representative of the series. The surface layer is dark-brown or dark reddish-brown clay 7 inches thick. The uppermost part of the subsoil is dark-brown or dark reddish-brown clay, and the lower part is brown or reddish-brown clay. The subsoil is mottled throughout with gray, brown, and red. A few areas are underlain by red to reddish-brown, calcareous sandy clay loam to fine sandy loam. Most areas are level, but some are gently undulating.

Included in mapping were a few small areas where the surface layer is fine sandy loam or silt loam, and a few spots of Portland, Perry, and Sharkey soils.

When dry, this soil contracts and cracks, and when wet it expands and seals over. Runoff is very slow, and excess water is a severe hazard. Permeability is very slow, except when the soil is cracked; it is rapid until the cracks seal over again. The available water capacity is high. Reaction is neutral or slightly acid in the surface layer and neutral to mildly alkaline below. Natural fertility is high.

This soil can be cultivated only within a narrow range of moisture content. In undrained areas, farming operations commonly are delayed for several days after a rain. Seedbed preparation is difficult, and tilth is difficult to maintain. (Capability unit IIIw–1, Vw–1 in frequently flooded areas; woodland group 2w6)

Hebert Series

The Hebert series consists of somewhat poorly drained, moderately slowly permeable soils on low natural levees. These soils occur as long, narrow strips, chiefly along bayous and abandoned channels. They formed in mixed alluvium deposited by the Arkansas River.

In a typical profile the surface layer is very dark grayish-brown silt loam and the subsurface layer is grayish-brown silt loam. The subsoil is strong-brown to grayish-brown, mottled silt loam. Below is reddish-brown, mottled silt loam.

Hebert soils are associated with the well-drained Rilla soils and the somewhat poorly drained McGehee and Portland soils. They are grayer than Rilla soils, coarser textured in the subsoil than Portland soils, and coarser textured in the substratum than McGehee soils.

Typical profile of Hebert silt loam, in a moist cultivated area in the NW¼SE¼SW¼ sec. 17, T. 12 S., R. 3 W.

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, subangular blocky structure; very friable; many fine roots; few, fine, brown concretions; strongly acid; abrupt, smooth boundary.

A2—6 to 13 inches, grayish-brown (10YR 5/2) silt loam; common, fine and medium, distinct, yellowish-brown (10YR 5/6) mottles and faint, brown (10YR 5/3) mottles; moderate, medium, subangular blocky structure; friable; many fine roots and pores; many, fine, brown concretions; strongly acid; gradual, wavy boundary.

B21t—13 to 33 inches, grayish-brown (10YR 5/2) silt loam; few, medium, distinct, yellowish-brown (10YR 5/6) mottles and common, medium, faint, gray (10YR 5/1) mottles; moderate, medium, angular blocky structure; friable; continuous, gray silt coatings on ped faces; few, thin, patchy clay films; many fine roots and pores; few, fine, brown concretions; strongly acid; gradual, wavy boundary.

B22t—33 to 53 inches, mottled strong-brown (7.5YR 5/6), gray (10YR 5/1), and dark-gray (10YR 4/1) silt loam; moderate, medium, subangular blocky structure; firm; silt coatings on vertical ped faces; common, thin, patchy clay films; few fine roots; many fine pores; few, fine, dark concretions; strongly acid; clear, wavy boundary.

C—53 to 72 inches, reddish-brown (5YR 4/4) silt loam that has thin lenses of silty clay; few, coarse, prominent, strong-brown (7.5YR 5/6) mottles; massive; friable; mildly alkaline.

The Ap horizon ranges from very dark grayish brown to brown in color, and in places has fine to medium, distinct mottles of brown and gray. The B21t horizon is silt loam or silty clay loam. The B22t horizon ranges from strong brown to grayish brown in color. The texture is silt loam or silty clay loam that has faint to distinct, fine to coarse mottles of brown and gray. The C horizon is brown to reddish-brown silt loam to fine sandy loam mottled with brown, gray, and red. In places this horizon is thinly stratified with finer textured sediments.

Reaction is medium acid to strongly acid in the A and B horizons and slightly acid to mildly alkaline in the C horizon.

Hebert silt loam (He).—This soil has a surface layer of very dark grayish-brown to brown silt loam 6 to 13 inches thick. The subsoil is strong-brown to grayish-brown silt loam or silty clay loam mottled with brown and gray. Below is brown to reddish-brown silt loam to fine sandy loam mottled with brown, gray, and red.

Included in mapping were a few small areas where the surface layer is fine sandy loam. Also included were spots of Rilla and McGehee soils.

Runoff is slow, and permeability is moderately slow. The available water capacity is high. Reaction in the crop rooting zone is medium acid to strongly acid. Natural fertility is high.

This soil is well suited to crops (fig. 5), but excess water is a moderate hazard. In undrained areas farming operations commonly have to be delayed a few days after a rain. Tilth is easy to maintain. (Capability unit IIw-1; woodland group 2w5)

McGehee Series

The McGehee series consists of somewhat poorly drained, level, slowly permeable soils on low natural levees. These soils formed in loamy sediments and the underlying clayey sediments deposited chiefly by the Arkansas River.

In a typical profile the surface layer is brown silt loam. The upper part of the subsoil is grayish-brown to reddish-brown, mottled silty clay loam. Below is dark reddish-brown, mottled silty clay or clay that is underlain by dark grayish-brown clay.

McGehee soils are associated with the somewhat poorly drained Hebert and Portland soils and the well-drained Rilla soils. They have a finer textured, redder subsoil than Hebert soils, are grayer than Portland soils, and are grayer and have a finer textured subsoil than Rilla soils.

Typical profile of McGehee silt loam, in a moist cultivated field in the SE¼SW¼SW¼ sec. 14, T. 13 S., R. 3 W.

Ap—0 to 7 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; friable; many fine roots; few fine pores; strongly acid; clear, smooth boundary.

B21t—7 to 11 inches, grayish-brown (10YR 5/2) silty clay loam; common, medium, faint, brown (10YR 5/3) and gray (10YR 5/1) mottles; moderate, medium, subangular blocky structure; firm; common, thick clay films; silt coatings on most ped faces; many fine roots; many fine pores; few, fine, black concretions; strongly acid; clear, smooth boundary.

B22t—11 to 16 inches, variegated reddish-brown (5YR 5/4), grayish-brown (10YR 5/2), and brownish-yellow (10YR 6/8) silty clay loam; moderate, medium, subangular blocky structure; firm; common, thick clay films; silt coatings on most vertical ped faces; few fine roots and pores; few, fine, black concretions; medium acid; abrupt, wavy boundary.

IIB31—16 to 28 inches, reddish-brown (5YR 4/4) silty clay; few, fine, faint, yellowish-red mottles; moderate, medium, subangular blocky structure; very firm; few fine roots and pores; few, fine, black concretions; neutral; gradual, smooth boundary.

IIB32—28 to 41 inches, dark reddish-brown (5YR 3/4) clay; common, medium, distinct, yellowish-red (5YR 4/6) mottles; moderate, medium, subangular blocky structure; very firm; few fine roots and pores; many calcium carbonate nodules ranging from 1/16 to ½ inch in diameter; mildly alkaline; gradual, smooth boundary.

IIC1—41 to 65 inches, dark reddish-brown (5YR 3/4) clay; many, fine, faint, strong-brown mottles; massive; very firm; few fine roots and pores; many calcium carbonate nodules up to ½ inch in diameter; moderately alkaline; clear, smooth boundary.

IIC2—65 to 72 inches, dark grayish-brown (10YR 4/2) clay; many, fine, distinct, strong-brown and yellowish-red mottles; very firm; many, fine, black concretions; moderately alkaline.

The A horizon is dark grayish brown to brown in color. The Bt horizon is grayish brown to reddish brown in color and is mottled with gray, brown, and red. The IIB horizon is clay or silty clay in texture and reddish brown or dark reddish brown in color. Gray mottles are in the IIB horizon in some areas. The IIC horizon is dark grayish-brown to dark reddish-brown clay or silty clay, mottled with gray, brown, and red. The mottles throughout the profile are fine to medium in size and few to many in number.

The reaction is strongly acid or medium acid in the A and Bt horizons and slightly acid to moderately alkaline in the IIB and IIC horizons.

In these soils the depth to the clayey texture is a few inches less than the defined range for the series, but this difference does not alter their usefulness and behavior.

McGehee silt loam (Mc).—In this soil the surface layer consists of brown to dark grayish-brown silt loam 7 inches thick. The upper part of the subsoil is grayish-brown to reddish-brown silty clay loam mottled with brown, red, and gray. Below is dark grayish-brown to dark reddish-brown clay or silty clay mottled with brown, red, and gray.

Included in mapping were a few spots of Hebert, Portland, and Rilla soils.

Runoff is slow, and excess water is a moderate hazard. Permeability is slow, and the available water capacity is high. Natural fertility is high. Reaction is medium acid or strongly acid in the surface layer and uppermost part of the subsoil. It is slightly acid to moderately alkaline in the lower part.

If drained, this soil is well suited to crops. In undrained areas, farming operations are commonly delayed in spring. Tilth is easy to maintain. (Capability unit IIw-1; woodland group 2w5)

Newellton Series

The Newellton series consists of somewhat poorly drained, slowly permeable, level and gently undulating soils in slack-water areas. These soils formed in thin beds of clayey sediments and the underlying loamy sediments.

In a typical profile the surface layer is very dark grayish-brown clay. The uppermost part of the subsoil is dark grayish-brown silty clay. The lower part is dark grayish-brown, mottled silt loam. It is underlain by mottled silt loam and fine sandy loam.

Newellton soils are associated with the poorly drained Tunica and Sharkey soils and the somewhat poorly drained Commerce soils. Newellton soils formed in thinner beds of clayey sediments than Tunica and Sharkey soils. They are finer textured in the uppermost 13 to 20 inches than Commerce soils.

Typical profile of Newellton clay, 0 to 1 percent slopes, in a moist cultivated field in the NE¼SW¼NW¼ sec. 17, T. 7 S., R. 1 E.

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) clay; weak, fine, subangular blocky structure; firm, plastic; few fine pores; plentiful fine roots; slightly acid; clear, smooth boundary.

B2—5 to 15 inches, dark grayish-brown (10YR 4/2) silty clay; common, fine, distinct, yellowish-brown mottles; moderate, fine, subangular blocky structure; firm, plastic; common fine pores; plentiful fine roots; slightly acid; gradual, smooth boundary.

B3—15 to 22 inches, mottled grayish-brown (10YR 5/2), brown (10YR 4/3), and dark-gray (10YR 4/1) silt loam; weak, fine, subangular blocky structure; friable; common fine pores; few fine roots; medium acid; gradual, smooth boundary.

Figure 5.—**Cotton (left) and soybeans (right) on Hebert silt loam. These are among the many crops suitable for this soil.**

IIC1—22 to 36 inches, mottled grayish-brown (10YR 5/2), yellowish-brown (10YR 5/6), and light brownish-gray (10YR 6/2) silt loam; few thin lenses of gray (10YR 5/1) silty clay loam; weak, fine, subangular blocky structure; friable; common fine and medium pores; very few fine roots; slightly acid; clear, smooth boundary.

IIC2—36 to 86 inches, yellowish-brown (10YR 5/4) fine sandy loam; common, medium, faint, light brownish-gray (10YR 6/2) mottles; few thin lenses of grayish-brown (10YR 5/2) very fine sandy loam; massive; very friable to loose; mildly alkaline.

The A horizon is dark grayish brown or very dark grayish brown in color. The B2 horizon is grayish-brown or dark grayish-brown clay or silty clay. The combined thickness of the clayey horizons is 13 to 20 inches. The IIC1 and IIC2 horizons are dark grayish-brown to brown silt loam to sandy loam. Commonly, there is a IIC3 horizon of thinly stratified sands, silts, and clays.

The reaction is slightly acid to mildly alkaline in the A horizon, medium acid to mildly alkaline in the B horizon, and slightly acid to mildly alkaline in the IIC horizon.

Newellton clay, 0 to 1 percent slopes (NeA).—This soil has the profile described as representative of the series. The surface layer is dark grayish-brown or very dark grayish-brown clay 5 inches thick. The uppermost part of the subsoil is grayish-brown or dark grayish-brown clay or silty clay. The lower part is dark grayish-brown to brown silt loam to sandy loam mottled with gray and brown. The combined thickness of the clayey layers is 13 to 20 inches.

Included in mapping were a few spots of Tunica, Sharkey, and Commerce soils.

When dry, the clayey layers contract and crack, and when wet, they expand and seal over. Permeability is slow, except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is very slow, and excess water is a severe hazard. The available water capacity is high. Reaction is slightly acid to mildly alkaline in the surface layer, medium acid to mildly alkaline in the uppermost part of the subsoil, and slightly acid to mildly alkaline in the lower part. Natural fertility is high.

This soil can be cultivated only within a narrow range of moisture content, and in areas not drained, planting may have to be delayed in spring. Seedbed preparation is difficult, and tilth is hard to maintain. (Capability unit IIIw-1, Vw-1 in frequently flooded areas; woodland group 2w5)

Newellton clay, gently undulating (NeU).—This soil occupies low, parallel ridges and swales. The ridges are 1 to 3 feet high, 75 to 300 feet wide, and 1/8 to 3/4 mile long. Between the ridges are swales that are 50 to 150 feet wide.

The surface layer is dark grayish-brown or very dark grayish-brown clay 5 inches thick. The uppermost part of the subsoil is grayish-brown or dark grayish-brown clay or silty clay. The lower part is dark grayish-brown to brown silt loam to sandy loam that is mottled with gray and brown. The combined thickness of the clayey layers is 13 to 20 inches.

Included in mapping were a few spots of Tunica, Sharkey, and Commerce soils.

When dry, the clayey layers contract and crack, and when wet, they expand and seal over. Permeability is slow, except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is slow to ponded in the swales and is slow to medium from the ridges. Excess water is a severe hazard. The available water capacity is high. Reaction is slightly acid to mildly alkaline in the surface layer, medium acid to mildly alkaline in the uppermost part of the subsoil, and slightly acid to mildly alkaline below it. Natural fertility is high.

This soil can be cultivated only within a narrow range of moisture content, and in areas not drained, planting may have to be delayed in spring. Seedbed preparation is difficult, and tilth is hard to maintain. (Capability unit IIIw–1, Vw–1 in frequently flooded areas; woodland group 2w5)

Perry Series

The Perry series consists of poorly drained, very slowly permeable soils on bottom lands. These soils formed in thick beds of fine-textured slack-water deposits, mainly from the Arkansas River. The areas are predominantly level, but some are gently undulating.

In a typical profile the surface layer is gray clay and the subsoil is gray or dark-gray mottled clay. Below this is reddish-brown clay.

Perry soils are associated with the somewhat poorly drained Portland and Hebert soils. They are grayer and deeper than the associated soils and are finer textured than Hebert soils.

Typical profile of Perry clay, in a moist hardwood forest in the NE¼SW¼SW¼ sec. 30, T. 11 S., R. 3 W.

O1—1 inch to 0, leaf and twig litter.

A11—0 to 2 inches, gray (10YR 5/1) clay; few, fine, prominent, strong-brown mottles; weak, fine and medium, granular structure; firm, sticky, plastic; some peds coated with black humus; many roots; very strongly acid; clear, wavy boundary.

A12—2 to 6 inches, gray (10YR 5/1) clay; common, medium and coarse, prominent, strong-brown (7.5YR 5/6) mottles; weak, fine, subangular blocky structure; very sticky and very plastic; few pores; many roots; few black streaks; very strongly acid; clear, wavy boundary.

B21g—6 to 18 inches, gray (10YR 5/1) clay; few, fine, distinct, strong-brown mottles; weak, medium, angular blocky structure; very sticky and very plastic; common slickensides; common roots; few black streaks; few pores; very strongly acid; gradual, wavy boundary.

B22g—18 to 28 inches, gray (10YR 5/1) clay; few, medium, prominent, dark-brown (10YR 4/3) mottles; weak, medium, angular blocky structure when moist, massive when wet; firm, very sticky, very plastic; common slickensides; common fine pores; common roots; very strongly acid; gradual, wavy boundary.

B3g—28 to 41 inches, dark-gray (10YR 4/1) clay; common, medium, prominent, reddish-brown (5YR 4/3) mottles; weak, medium, subangular blocky structure when moist, massive when wet; firm, very sticky, very plastic; common slickensides; pressure faces on most peds; few, fine, black concretions; few, sinuous, black streaks; common roots; slightly acid; clear, wavy boundary.

IIC—41 to 72 inches, reddish-brown (5YR 4/3) clay; massive; firm, very sticky, very plastic; few slickensides; few roots; few, fine, black concretions; few, sinuous, black streaks; neutral.

The A horizon is gray or dark-gray clay, or grayish-brown or dark grayish-brown silt loam. The Bg horizon is gray or dark gray and mottled with yellowish brown to reddish brown. In some profiles the B3g horizon is lacking. The IIC horizon is red to reddish-brown clay or silty clay.

The reaction of the A horizon through the B22g horizon ranges from very strongly acid to slightly acid. In the lower horizons it ranges from slightly acid to mildly alkaline.

In some areas the content of clay is less than 60 percent. These areas are considered outside the defined range for the series, but this difference does not alter their usefulness and behavior.

Perry silt loam (Pc).—The surface layer is grayish-brown or dark grayish-brown silt loam 4 to 8 inches thick. The subsoil is gray or dark-gray clay mottled with yellowish brown to reddish brown. Below this is red to reddish-brown clay or silty clay.

Included in mapping were a few areas where the surface layer is clay. Also included were spots of Portland, Desha, Sharkey, and McGehee soils.

Runoff is very slow, and excess water is a severe hazard. Permeability is moderately slow in the surface layer and very slow in the subsoil. When dry, the clayey subsoil cracks. The available water capacity is high. Reaction is very strongly acid to slightly acid in the root zone. Natural fertility is moderate to high.

In undrained areas farming operations commonly are delayed for several days after a rain. Tilth is easy to maintain. (Capability unit IIIw–1; woodland group 2w6)

Perry clay (Pe).—This soil has the profile described as representative of the series. It is level to gently undulating.

The surface layer is gray or dark-gray clay 6 inches thick. The subsoil is gray or dark-gray clay mottled with yellowish brown to reddish brown. Below is red to reddish-brown clay or silty clay.

Included in mapping were a few areas where the surface layer is silt loam. Also included were spots of Portland, Desha, and Sharkey soils.

When dry, this soil contracts and cracks, and when wet, it expands and seals over. Permeability is very slow, except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is very slow, and excess water is a severe hazard. The available water capacity is high. Reaction is very strongly acid to slightly acid in the root zone. Natural fertility is moderate to high.

This soil can be cultivated only within a narrow range of moisture content, and in areas not drained, farming operations commonly are delayed for several days after a rain. Seedbed preparation is difficult, and tilth is hard to maintain. (Capability unit IIIw–1; woodland group 2w6)

Portland Series

The Portland series consists of somewhat poorly drained, very slowly permeable soils. These soils formed in thick beds of slack-water deposits from the Arkansas River. Most areas are level, but some are gently undulating.

In a typical profile the surface layer is dark-brown clay. The subsoil is brown, mottled clay. Below is clay that has red and brown variegations.

Portland soils are associated with the poorly drained Perry soils and the somewhat poorly drained Desha, Hebert, and McGehee soils. They are redder than all the associated soils except Desha soils, and are finer textured than Hebert and McGehee soils. They are not so dark in the surface layer and uppermost part of the subsoil as Desha soils.

Typical profile of Portland clay, in a moist cultivated field in the NE¼SW¼SE¼ sec. 15, T. 13 S., R. 3 W.

Ap—0 to 6 inches, dark-brown (10YR 3/3) clay; moderate, fine, subangular blocky structure; firm, plastic; many fine roots; few, fine, black concretions; medium acid; clear, wavy boundary.

B2—6 to 34 inches, brown (7.5YR 5/4) clay; common, medium, distinct, gray (10YR 5/1), and yellowish-red (5YR 5/6) mottles; moderate, medium, subangular blocky structure; firm, plastic; many pressure faces on peds; few slickensides; few fine roots; few, fine, black concretions; very strongly acid; gradual, wavy boundary.

C1—34 to 52 inches, reddish-brown (5YR 4/4) clay; few, fine, faint, brown mottles; massive; firm; few slickensides; few fine roots; few, fine, black concretions; few calcium carbonate nodules; mildly alkaline; calcareous; gradual, wavy boundary.

C2—52 to 72 inches, variegated red (2.5YR 4/6), reddish-brown (5YR 4/4), and yellowish-red (5YR 4/6) clay that contains lenses of silty clay and pockets of silt; massive; firm; few, medium, black concretions; moderately alkaline; calcareous.

The A horizon is grayish-brown to dark-brown silt loam or clay. The B2 and C1 horizons are brown to reddish-brown clay that has few to many mottles of gray, red, and brown. The C2 horizon is clay to clay loam, variegated in shades of red and brown. In some profiles this horizon has gray mottles. The reaction ranges from slightly acid to strongly acid in the A horizon and from very strongly acid to strongly acid in the B horizon. The C horizon ranges from mildly alkaline to moderately alkaline and is calcareous.

Portland silt loam (Po).—This soil is level to nearly level. The surface layer is grayish-brown to dark-brown silt loam 5 to 7 inches thick. The subsoil is brown to reddish-brown clay mottled with gray, red, and brown. Below this is variegated red and brown clay to clay loam.

Included in mapping were a few small areas where the surface layer is clay and a few spots of Hebert, McGehee, and Perry soils.

Runoff is very slow, and excess water is a severe hazard. Permeability is moderately slow in the surface layer and very slow below. When dry, cracks form in the clayey subsoil. The available water capacity is high. Reaction is strongly acid to slightly acid in the surface layer, very strongly acid or strongly acid in the subsoil, and mildly alkaline to moderately alkaline and calcareous below. Natural fertility is high.

In undrained areas, farming operations commonly are delayed several days after a rain. Tilth is easy to maintain. (Capability unit IIIw–1; woodland group 2w6)

Portland clay (Pr).—This soil has the profile described as representative of the series. It is level to gently undulating.

The surface layer is grayish-brown to dark-brown clay 4 to 7 inches thick. The subsoil is brown to reddish-brown clay mottled with gray, red, and brown. Below this is variegated red and brown clay to clay loam.

Included in mapping were a few small areas where the surface layer is silt loam. Also included were a few spots of Desha, Perry, and McGehee soils.

When dry, this soil contracts and cracks, and when wet, it expands and seals over. Runoff is very slow, and excess water is a severe hazard. Permeability is very slow, except when the soil is cracked; it is rapid until the cracks again seal over. The available water capacity is high. Reaction is strongly acid to slightly acid in the surface layer, very strongly acid or strongly acid in the subsoil, and mildly alkaline to moderately alkaline and calcareous below. Natural fertility is high.

This soil can be cultivated only within a narrow range of moisture content. In undrained areas, farming operations commonly have to be delayed for several days after a rain. Seedbed preparation is difficult, and tilth is hard to maintain. (Capability unit IIIw–1; woodland group 2w6)

Rilla Series

The Rilla series consists of well-drained, moderately slowly permeable soils on natural levees. These soils formed in mixed alluvium deposited by the Arkansas River. They are level and nearly level. They occur as long, narrow strips, chiefly along the large bayous and their abandoned channels.

In a typical profile the surface layer is brown silt loam. The subsoil is yellowish-red silty clay loam that overlies reddish-brown silt loam. Below this is brown, mottled silt loam.

Rilla soils are associated with the well-drained Tutwiler soils and the somewhat poorly drained Portland, Hebert, and McGehee soils. They are redder and finer textured in the subsoil than Tutwiler soils, redder than Hebert soils, and redder and coarser textured in the subsoil than McGehee soils. They are coarser textured than Portland soils and lack the mottling that is characteristic of those soils.

Typical profile of Rilla silt loam, 0 to 1 percent slopes, in a moist cultivated area in the SE¼SE¼SE¼ sec. 33, T. 12 S., R. 2 W.

Ap—0 to 8 inches, brown (7.5YR 5/4) silt loam; weak, fine, granular structure; friable; few fine roots; few, fine, dark concretions; medium acid; abrupt, smooth boundary.

B21t—8 to 19 inches, yellowish-red (5YR 4/6) silty clay loam; moderate, medium, subangular blocky structure; firm; some peds coated with gray silt; common, thin, patchy clay films; few fine roots; few fine pores; few, fine, dark concretions; very strongly acid; gradual, smooth boundary.

B22t—19 to 30 inches, yellowish-red (5YR 5/6) silty clay loam; moderate, medium, angular blocky structure; firm; some peds coated with gray silt; few, thin, patchy clay films; many fine pores; few fine roots; few, fine, dark concretions; very strongly acid; gradual, wavy boundary.

B3—30 to 48 inches, reddish-brown (5YR 5/4) silt loam that has streaks and splotches of brown (7.5YR 5/4) and pinkish gray (7.5YR 7/2); moderate, medium, angular blocky structure; firm; some peds coated with gray silt; few fine roots; common fine pores; few, fine, dark concretions; very strongly acid; clear, smooth boundary.

C—48 to 72 inches, brown (7.5YR 5/4) silt loam streaked with gray (10YR 6/1) and strong brown (7.5YR 5/6); weak, medium, subangular blocky structure; friable; many fine pores; strongly acid.

The A horizon is brown or dark brown in color. The B horizon is yellowish red or reddish brown in color, and is silt loam or silty clay loam in texture. The C horizon is brown to red in color and fine sandy loam to silty clay loam in texture.

Reaction is slightly acid to strongly acid in the A horizon and medium acid to very strongly acid in the B and C horizons.

Rilla silt loam, 0 to 1 percent slopes (RsA).—This soil has the profile described as representative of the series. The surface layer is brown or dark-brown silt loam

8 inches thick. The subsoil is yellowish-red or reddish-brown silt loam or silty clay loam. The material below is fine sandy loam to silty clay loam in texture. In color, it is brown and red, splotched with gray.

Included in mapping were a few small areas where the surface layer is fine sandy loam and a few spots of Tutwiler, Hebert, and McGehee soils.

Runoff is slow, and permeability is moderately slow. The available water capacity is high, and natural fertility is high. Reaction is slightly acid to strongly acid in the surface layer and medium acid to very strongly acid below.

This soil is well suited to crops. It warms up early in spring, and early planting is possible. Tilth is easy to maintain. (Capability unit I–1; woodland group 2o4)

Rilla silt loam, 1 to 3 percent slopes (RsB).—This soil has a surface layer of brown or dark-brown silt loam 4 to 7 inches thick. The subsoil is yellowish-red or reddish-brown silt loam or silty clay loam. The material below is fine sandy loam to silty clay loam in texture. In color, it is brown and red splotched with gray.

Included in mapping were a few small areas where the surface layer is fine sandy loam and where the slopes are gently undulating. Also included were a few spots of Tutwiler, Hebert, and McGehee soils.

Runoff is slow to medium, and erosion is a slight to moderate hazard. Permeability is moderately slow. The available water capacity is high. Reaction is slightly acid to strongly acid in the surface layer and medium acid to very strongly acid below. Natural fertility is high.

This soil is well suited to crops. It warms up early in spring, and early planting is possible. Tilth is easy to maintain. (Capability unit IIe–1; woodland group 2o4)

Robinsonville Series

The Robinsonville series consists of well-drained, moderately permeable soils that are on the higher parts of natural levees. These soils are derived from young, thinly stratified loamy sediments.

In a typical profile the surface layer is dark-brown silt loam. The material below this is brown or light-brown silt loam to fine sandy loam.

Robinsonville soils are associated with the somewhat poorly drained Bowdre and Desha soils. They are coarser textured in the uppermost 12 to 20 inches than Bowdre soils and are coarser textured throughout than Desha soils.

In Desha County Robinsonville soils are mapped only as part of an undifferentiated group with Bowdre and Desha soils.

Typical profile of Robinsonville silt loam (Bowdre, Desha, and Robinsonville soils, gently undulating), in a moist cultivated field in the NE¼SE¼SE¼ sec. 7, T. 9 S., R. 2 W.

Ap—0 to 6 inches, dark-brown (7.5YR 4/4) silt loam; weak, fine, granular structure; friable; many fine roots; neutral; abrupt, smooth boundary.

C1—6 to 16 inches, brown (7.5YR 5/4) fine sandy loam; massive; very friable; many bedding planes; few fine roots; neutral; gradual, smooth boundary.

C2—16 to 31 inches, light-brown (7.5YR 6/4) fine sandy loam; massive; very friable; many bedding planes; neutral; clear, smooth boundary.

C3—31 to 50 inches, light-brown (7.5YR 6/4) silt loam that has common lenses ⅛ to ¼ inch thick of yellowish-red (5YR 4/6) silty clay loam; massive; friable; many bedding planes; few fine roots; mildly alkaline.

The A horizon is brown or dark brown in color. The C1 horizon is light brown or brown in color and silt loam to sandy loam in texture. The C2 and C3 horizons have the same color and texture range as the C1 horizon, but they include thin lenses of finer textured material. In some profiles there are few to common, fine or medium, gray mottles below a depth of 24 inches.

Reaction ranges from slightly acid to mildly alkaline throughout.

Sharkey Series

The Sharkey series consists of poorly drained, very slowly permeable soils on broad flats. These soils formed in thick beds of fine-textured slack-water deposits from the Arkansas, White, and Mississippi Rivers. They are predominantly level, but some are gently undulating.

In a typical profile the surface layer is very dark grayish-brown clay. The subsoil is dark or dark-gray, mottled clay. Below this is gray, mottled clay.

Sharkey soils are associated with the somewhat poorly drained Desha and Newellton soils and the poorly drained Tunica soils. They are grayer than Desha soils and lack the loamy lower horizons that are characteristic of Newellton and Tunica soils.

Typical profile of Sharkey clay, in a moist cultivated field in the SW¼SW¼NW¼ sec. 20, T. 7 S., R. 1 E.

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) clay; weak, fine, subangular blocky structure; plastic; few fine pores; common fine roots; neutral; abrupt, smooth boundary.

B21g—5 to 10 inches, gray (10YR 5/1) clay; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; firm, plastic; few fine pores; few fine roots; neutral; clear, smooth boundary.

B22g—10 to 15 inches, dark-gray (10YR 4/1) clay; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, subangular blocky structure when moist, massive when wet; firm, plastic; few fine pores; few fine roots; neutral; gradual, smooth boundary.

B23g—15 to 30 inches, gray (10YR 5/1) clay; common, medium, prominent, yellowish-red (5YR 5/6) mottles; weak, medium, subangular blocky structure when moist, massive when wet; firm, plastic; few slickensides; few fine pores; few fine roots; neutral; gradual, wavy boundary.

Cg—30 to 80 inches, gray (10YR 5/1) clay; common, medium and coarse, distinct, yellowish-brown (10YR 5/4) mottles; massive; plastic; common slickensides intersecting at acute angles; very few pores; neutral.

The color of the A horizon ranges from gray to very dark grayish brown. The texture is clay or silt loam. The B21g horizon is gray or dark gray. In some profiles the B22g horizon is lacking. In others, a IIC horizon of reddish-brown clay begins at a depth below 36 inches. Reaction ranges from slightly acid to mildly alkaline throughout the profile.

Sharkey clay (Sh).—Most areas of this soil are level, but some are gently undulating. This soil has the profile described as representative of the series. The surface layer is gray to very dark grayish-brown clay 5 inches thick. In most areas the subsoil and underlying material are gray to dark-gray clay mottled with brown and gray. In a few areas the underlying material is reddish-brown clay.

Included in mapping were a few small areas that have a thick, dark surface layer, and a few spots of Desha, Tunica, and Newellton soils.

When dry, this soil contracts and cracks, and when wet, it expands and seals over. Permeability is very slow except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is very slow, and excess water is a severe hazard. The available water capacity is high. Reaction is slightly acid to mildly alkaline. Natural fertility is high.

This soil can be cultivated only within a narrow range of moisture content, and in areas not drained, farming operations commonly are delayed for several days after a rain. Seedbed preparation is difficult. Tilth is hard to maintain. (Capability unit IIIw-1, Vw-1 in frequently flooded areas; woodland group 2w6)

Sharkey-Commerce-Coushatta association, frequently flooded (Sm).—This association occurs along the Mississippi and Arkansas Rivers in areas not protected by levees. In most years it is subject to frequent flooding during the growing season. Some areas of this association cover several thousand acres. Sharkey soils make up about 40 percent of the association, Commerce soils about 30 percent, and Coushatta soils about 20 percent. The rest consists of small areas of Robinsonville, Newellton, Desha, and Tunica soils.

Sharkey soils have a surface layer of gray to very dark grayish-brown clay 5 inches thick. In most places the subsoil and underlying material are gray to dark-gray clay mottled with gray and brown. In a few places the underlying material is reddish-brown clay.

Commerce soils have a 5-inch surface layer of brown to dark grayish-brown silt loam or silty clay loam mottled with gray and brown. Below is grayish-brown to dark-gray, mottled silt loam or silty clay loam.

Coushatta soils have a surface layer of dark-brown or brown silt loam or silty clay loam 5 inches thick. The subsoil is reddish-brown or dark reddish-brown silt loam or silty clay loam. The underlying material is dark-brown or strong-brown, thinly stratified sandy loam to silty clay loam.

Shallow, intermittent lakes cover some of the low, level areas of Sharkey soils part of each year. When dry, these soils contract and crack, and when wet they expand and seal over. Permeability is very slow in the Sharkey soils and moderately slow in the other soils. The available water capacity is high. Reaction is slightly acid to moderately alkaline. Natural fertility is high.

This association is well suited to hardwoods and to wildlife habitat. It is not suitable for cultivation and is used only at low intensity, because it is frequently flooded and inaccessible. (Capability unit Vw-1. Sharkey part in woodland group 2w6; Commerce part in woodland group 1w5; Coushatta part in woodland group 1o4)

Sharkey and Desha silt loams (Sr).—In this undifferentiated group, the Sharkey soil makes up 50 to 60 percent of the acreage, and the Desha soil 30 to 40 percent. Either of these soils, or both, may occur in any given area. The soils are level and gently undulating.

Included in mapping were small spots of McGehee, Tunica, and Hebert soils and a few small areas where the surface layer is clay.

The Sharkey soil is poorly drained. It has a surface layer of very dark grayish-brown to grayish-brown silt loam 5 to 8 inches thick. In most places the subsoil and underlying material are gray to dark-gray clay mottled with gray and brown. In some places the underlying material is reddish-brown clay. The Desha soil is somewhat poorly drained. It has a surface layer of dark-brown or dark reddish-brown silt loam 5 to 8 inches thick. The uppermost part of the subsoil is dark-brown or dark reddish-brown clay, and the lower part is brown or reddish-brown clay. The subsoil is mottled throughout with gray, brown, and red.

When dry, the subsoil contracts and cracks, and when wet it expands and seals over. Permeability is very slow except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is very slow, and wetness is a severe hazard. The available water capacity is high. Reaction is slightly acid to mildly alkaline. Natural fertility is high. In undrained areas, farming operations commonly are delayed for several days after a rain. Tilth is easy to maintain. (Capability unit IIIw-1; woodland group 2w6)

Sharkey and Desha clays, 0 to 1 percent slopes (SsA).—In this undifferentiated group, the Sharkey soil makes up 50 to 60 percent of the acreage, and the Desha soil 30 to 40 percent. Either of these soils, or both, may occur in any given area. Included in mapping were small spots of McGehee, Tunica, and Hebert soils and spots where the surface layer is silt loam.

The Sharkey soil is poorly drained. It has a surface layer of gray to very dark grayish-brown clay about 5 inches thick. In most places the subsoil and underlying material are gray to dark-gray clay mottled with gray and brown. In some places the underlying material is reddish-brown clay. The Desha soil is somewhat poorly drained. It has a surface layer of dark-brown or dark reddish-brown clay about 7 inches thick. The uppermost part of the subsoil is dark-brown or dark reddish-brown clay, and the lower part is brown or reddish-brown clay. The subsoil is mottled throughout with gray, brown, and red.

When dry, these soils contract and crack, and when wet, they expand and seal over. Permeability is very slow, except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is very slow, and wetness is a severe hazard. The available water capacity is high. Reaction is slightly acid to mildly alkaline. Natural fertility is high.

These soils can be cultivated only within a narrow range of moisture content, and in areas not drained, farming operations commonly are delayed for several days after a rain. Seedbed preparation is difficult, and tilth is hard to maintain. (Capability unit IIIw-1, Vw-1 in frequently flooded areas; woodland group 2w6)

Sharkey and Desha clays, gently undulating (SsU).—In this undifferentiated group, the Sharkey soil makes up 50 to 60 percent of the acreage, and the Desha soil 30 to 40 percent. Either of these soils, or both, may occur in any given area. The soils are gently undulating. They occupy low parallel ridges and swales. The ridges are 1 to 3 feet high, 75 to 300 feet wide, and 1/4 to 1 mile long. Between the ridges are swales 50 to 150 feet wide.

Included in mapping were small spots of McGehee, Tunica, and Hebert soils and spots where the surface layer is silt loam.

The Sharkey soil is poorly drained. It has a surface layer of gray to very dark grayish-brown clay about 5 inches thick. In most places the subsoil and underlying material are gray to dark-gray clay mottled with gray and brown. In some places the underlying material is reddish-brown clay.

The Desha soil is somewhat poorly drained. It has a surface layer of dark-brown or dark reddish-brown clay about 7 inches thick. The uppermost part of the subsoil is dark-brown or dark reddish-brown clay, and the lower part is brown or reddish-brown clay. The subsoil is mottled throughout with gray, brown, and red.

When dry, these soils contract and crack, and when wet they expand and seal over. Permeability is very slow, except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is medium on the ridges and very slow to ponded in the swales. Wetness is a severe hazard. The available water capacity is high. Reaction is slightly acid to mildly alkaline. Natural fertility is high.

These soils can be cultivated only within a narrow range of moisture content, and in areas not drained, farming operations commonly are delayed for several days after a rain. Seedbed preparation is difficult, and tilth is hard to maintain. (Capability unit IIIw–1, Vw–1 in frequently flooded areas; woodland group 2w6)

Tunica Series

The Tunica series consists of poorly drained, very slowly permeable, level to gently sloping soils in slack-water areas. These soils formed in thin beds of clayey sediments underlain by loamy sediments.

In a typical profile the surface layer is very dark grayish-brown clay. The underlying material is dark-gray, mottled silty clay that overlies dark-gray to grayish-brown, mottled silty clay loam and silt loam. Below this is grayish-brown loamy sand.

Tunica soils are associated with the somewhat poorly drained Newellton soils and the poorly drained Sharkey soils. They have thicker clayey layers than Newellton soils, but thinner clayey layers than Sharkey soils. Sharkey soils are clayey throughout the profile.

Typical profile of Tunica clay, 0 to 1 percent slopes, in a moist cultivated field in the SW¼NW¼NW¼ sec. 20, T. 7 S., R. 1 E.

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) clay; few, fine, faint, dark-gray and brown mottles; moderate, fine, subangular blocky structure; firm, plastic; few roots; few fine pores; slightly acid; clear, smooth boundary.

C1g—5 to 24 inches, dark-gray (10YR 4/1) silty clay; common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; firm, very plastic; few fine roots; few, fine, black concretions; medium acid; clear, smooth boundary.

IIC2g—24 to 38 inches, dark grayish-brown (10YR 4/2) silty clay loam; common, fine, faint, yellowish-brown mottles; weak, fine, subangular blocky structure; friable; many fine pores; few fine roots; common worm casts and worm channels; slightly acid; clear, smooth boundary.

IIC3g—38 to 45 inches, dark-gray (10YR 4/1) silt loam; common, medium, distinct, brown (10YR 4/3) mottles; weak, medium, subangular blocky structure; friable; about 15 percent of the volume is rounded lumps or plugs, 2 to 3 inches across, of dark-gray (10YR 4/1) silty clay; few fine pores; few fine roots; slightly acid; clear, smooth boundary.

IIIC4—45 to 72 inches, grayish-brown (10YR 5/2) loamy sand; single grain; loose; slightly acid.

The A horizon is dark grayish-brown to very dark gray clay. The C1g horizon is gray or dark-gray clay or silty clay. The combined thickness of the clayey horizons is 20 to 36 inches. The IICg horizons are grayish-brown to dark-gray silty clay loam to fine sandy loam mottled with brown. The IIIC horizon of grayish-brown to pale-brown loamy sand or sand is lacking in some profiles.

Reaction is medium acid to neutral throughout the profile.

Tunica clay, 0 to 1 percent slopes (TuA).—This soil has the profile described as representative of the series. The surface layer is dark grayish-brown to very dark gray clay about 5 inches thick. The underlying material is gray or dark-gray clay or silty clay. This overlies grayish-brown to dark-gray silty clay loam to fine sandy loam, which is mottled throughout with brown. Below this, in some areas, is grayish-brown to pale-brown loamy sand or sand. The combined thickness of the clayey layers is 20 to 36 inches. Included in mapping were a few spots of Newellton, Sharkey, and Commerce soils.

When dry, this soil contracts and cracks, and when wet, it expands and seals over. Permeability is very slow, except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is slow, and excess water is a severe hazard. The available water capacity is high. Reaction is medium acid to neutral, and natural fertility is high.

This soil can be cultivated only within a narrow range of moisture content, and in areas not drained, planting may have to be delayed in spring (fig. 6). Seedbed preparation is difficult, and tilth is hard to maintain. (Capability unit IIIw–1, Vw–1 in frequently flooded areas; woodland group 2w6)

Tunica clay, 1 to 3 percent slopes (TuB).—This soil has a surface layer of dark grayish-brown to very dark gray clay about 5 inches thick. The underlying material is gray or dark-gray clay or silty clay. This overlies grayish-brown to dark-gray silty clay loam to fine sandy loam that is mottled throughout with brown. The combined thickness of the clayey layers is 20 to 36 inches. Included in mapping were a few spots of Newellton, Sharkey, and Commerce soils.

When dry, this soil contracts and cracks, and when wet it expands and seals over. Permeability is very slow, except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is slow, and excess water is a severe hazard. The available water capacity is high. Reaction is medium acid to neutral, and natural fertility is high.

This soil can be cultivated only within a narrow range of moisture content, and in areas not drained, planting may have to be delayed in spring. Seedbed preparation is difficult, and tilth is hard to maintain. (Capability unit IIIw–1, Vw–1 in frequently flooded areas; woodland group 2w6)

Tunica clay, frequently flooded (Tv).—This soil has a surface layer of dark grayish-brown to very dark gray clay about 5 inches thick. The underlying material is

Figure 6.—Cotton on Tunica clay, 0 to 1 percent slopes. The poor stand results from inadequate drainage.

gray or dark-gray clay or silty clay. This overlies grayish-brown to dark-gray silty clay loam to fine sandy loam that is mottled throughout with brown. The combined thickness of the clayey layers is 20 to 36 inches. Included in mapping were a few spots of Newellton and Sharkey soils.

When dry, this soil contracts and cracks, and when wet it expands and seals over. Permeability is very slow, except when the soil is cracked; it is rapid until the cracks again seal over. Runoff is slow, and the available water capacity is high. Reaction is slightly acid to neutral, and natural fertility is high.

This soil is well suited to hardwood forest and wildlife habitat. It is not suited to cultivation, because of the frequent flooding. (Capability unit Vw-1; woodland group 2w6)

Tutwiler Series

The Tutwiler series consists of level, well-drained, moderately permeable soils on the higher parts of natural levees. These soils formed in loamy sediments deposited by the Arkansas River.

In a typical profile the surface layer is dark-brown silt loam and the suburface layer is brown loam. The subsoil is strong-brown to yellowish-red silt loam underlain by reddish-brown loam. The material below this is pale-brown and yellowish-red, mottled fine sandy loam and silt loam. This overlies reddish-brown, mottled silty clay.

Tutwiler soils are associated with the well-drained Rilla soils and the somewhat poorly drained Hebert and Desha soils. They are coarser textured in the subsoil than Rilla soils and are better drained and coarser textured throughout than Hebert and Desha soils.

Typical profile of Tutwiler silt loam, in a moist cultivated field in the SW¼SE¼SW¼ sec. 10, T. 9 S., R. 3 W.

Ap—0 to 6 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; few fine roots; few, fine, black concretions; slightly acid; abrupt, smooth boundary.

A2—6 to 18 inches, brown (7.5YR 5/4) loam; weak, medium, subangular blocky structure; very friable; few fine roots; common, fine, black concretions; neutral; clear, smooth boundary.

B21t—18 to 30 inches, yellowish-red (5YR 4/6) silt loam; moderate, medium, subangular blocky structure; very friable; common, thin, patchy clay films; few fine roots; common fine pores; few, fine, black concretions; slightly acid; gradual, wavy boundary.

B22t—30 to 39 inches, strong-brown (7.5YR 5/6) silt loam that has common, coarse, distinct, light-brown (7.5YR 6/4) mottles and few, fine, distinct, yellowish-red mottles; weak, medium, subangular blocky structure; very friable; few, thin, patchy clay films; many fine pores; few, fine, black concretions; strongly acid; clear, wavy boundary.

B3—39 to 43 inches, reddish-brown (5YR 5/4) loam; some vertical faces coated with very pale brown (10YR 7/3) silt; weak, medium, subangular blocky structure; very friable; few fine pores; few, fine, black concretions; medium acid; abrupt, wavy boundary.

C1—43 to 50 inches, pale-brown (10YR 6/3) fine sandy loam; few, fine, distinct, strong-brown mottles and faint, light-gray mottles; massive; very friable; medium acid; abrupt, wavy boundary.

C2—50 to 55 inches, yellowish-red (5YR 5/6) silt loam; gray silt in cracks; massive; friable; many fine pores; few, fine, black concretions; medium acid; abrupt, wavy boundary.

IIC3—55 to 72 inches, reddish-brown (5YR 4/3) silty clay that has few, fine, distinct, gray mottles; massive; firm, plastic; common, fine, black concretions; slightly acid.

The color of the Ap horizon is dark brown, brown, or yellowish brown. In texture, the A2 horizon is silt loam or loam. The color of the B2t horizon is strong brown or yellowish red. The texture of the B3 horizon is loam or silt loam. In some profiles the B3 horizon is lacking. The color of the C horizon ranges from pale brown to yellowish red. The texture is silt loam or fine sandy loam. The depth to the IIC horizon ranges from 48 to 96 inches.

Reaction is slightly acid or neutral in the A horizon, slightly acid to strongly acid in the B horizon, and medium acid or strongly acid in the C horizon. It is slightly acid to mildly alkaline in the IIC horizon.

These soils are outside the defined range for the series in color and reaction, but these differences do not alter their usefulness and behavior.

Tutwiler silt loam (Tw).—The surface layer of this soil is dark-brown to yellowish-brown, friable silt loam 6 inches thick. The subsurface layer is brown to yellowish-brown silt loam or loam 12 inches thick. The subsoil is strong-brown to yellowish-red silt loam that overlies reddish-brown loam. The material beneath this is pale-brown to yellowish-red, mottled silt loam to fine sandy loam underlain by reddish-brown, mottled silty clay. Included in mapping were a few spots of Rilla, Hebert, and Desha soils.

Surface runoff is slow, and permeability is moderate. The available water capacity and natural fertility are high. Reaction is slightly acid or neutral in the surface layer and slightly acid to strongly acid in the subsoil.

This soil is well suited to crops and pasture grasses. It warms up early in spring, and early planting is feasible. Tilth is easy to maintain. (Capability unit I-1; woodland group 2o4)

Use and Management of the Soils

This section contains information about the use and management of soils of Desha County for crops and pasture, woodland, wildlife, and engineering. It explains the system of capability classification used by the Soil Conservation Service and gives predicted yields of the principal crops grown in the county.

This section also contains a table that gives ratings of the soils for several nonfarm uses and tables that give information about soils significant in engineering.

Use of the Soils for Crops and Pasture

This section explains the system of capability grouping used by the Soil Conservation Service and discusses the management of the soils of Desha County by capability units. A table is provided that shows predicted yields under improved management.

The principal crops grown in the county include cotton, soybeans, rice, wheat, and pasture. The legumes most commonly grown are white clover, vetch, and annual lespedeza.

Most crops respond well to applications of lime and fertilizer. The amount applied should be based on the results of soil tests and the needs of the crop to be grown.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive land-forming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or engineering.

In the capability system, the kinds of soils are grouped at three levels: the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both. (None in this county.)

Class V soils are subject to little or no erosion, but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife habitat.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat. (None in this county.)

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat. (None in this county.)

Class VIII soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife habitat, or water supply, or to esthetic purposes. (None in this county.)

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-1 or IIIs-1. Thus, in one symbol, the Roman numeral designates the capability class or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraphs; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

The names of the soil series represented are mentioned in the description of each capability unit, but the listing of the series name does not necessarily indicate that all the soils of a series are in the same capability unit. The capability classification of any given soil can be learned by referring to the "Guide to Mapping Units."

In the following pages each of the capability units in Desha County is described, and suggestions for the use and management of the soils in each unit are given.

CAPABILITY UNIT I-1

This unit consists of deep, well-drained and somewhat poorly drained, level soils of the Commerce, Coushatta, Rilla, and Tutwiler series. These soils occur on natural levees. They have a surface layer of friable silt loam, except in some areas of Coushatta soils, where the surface layer is silty clay loam. The subsoil is loam to silty clay loam.

These soils are very strongly acid to moderately alkaline within the root zone. Natural fertility is high, and the organic-matter content is moderate. Permeability is moderately slow to moderate, and the available water capacity is high.

Many field crops, including cotton, soybeans, corn, small grain, and grain sorghum, are suitable. Truck crops, such as tomatoes, okra, and green beans, are also suitable. Suitable grasses include bermudagrass, dallisgrass, johnsongrass, bahiagrass, and tall fescue. Suitable legumes include vetch, lespedeza, crimson clover, and white clover.

These soils are easy to till and are well suited to furrow irrigation (fig. 7). Under good management, cultivated crops that produce a large amount of residue can be grown year after year.

CAPABILITY UNIT IIe-1

This unit consists of deep, well-drained to somewhat poorly drained, nearly level and gently undulating soils of the Commerce, Rilla, and Robinsonville series. These soils occur on natural levees. They have a surface layer of friable silt loam. Below is fine sandy loam to silty clay loam.

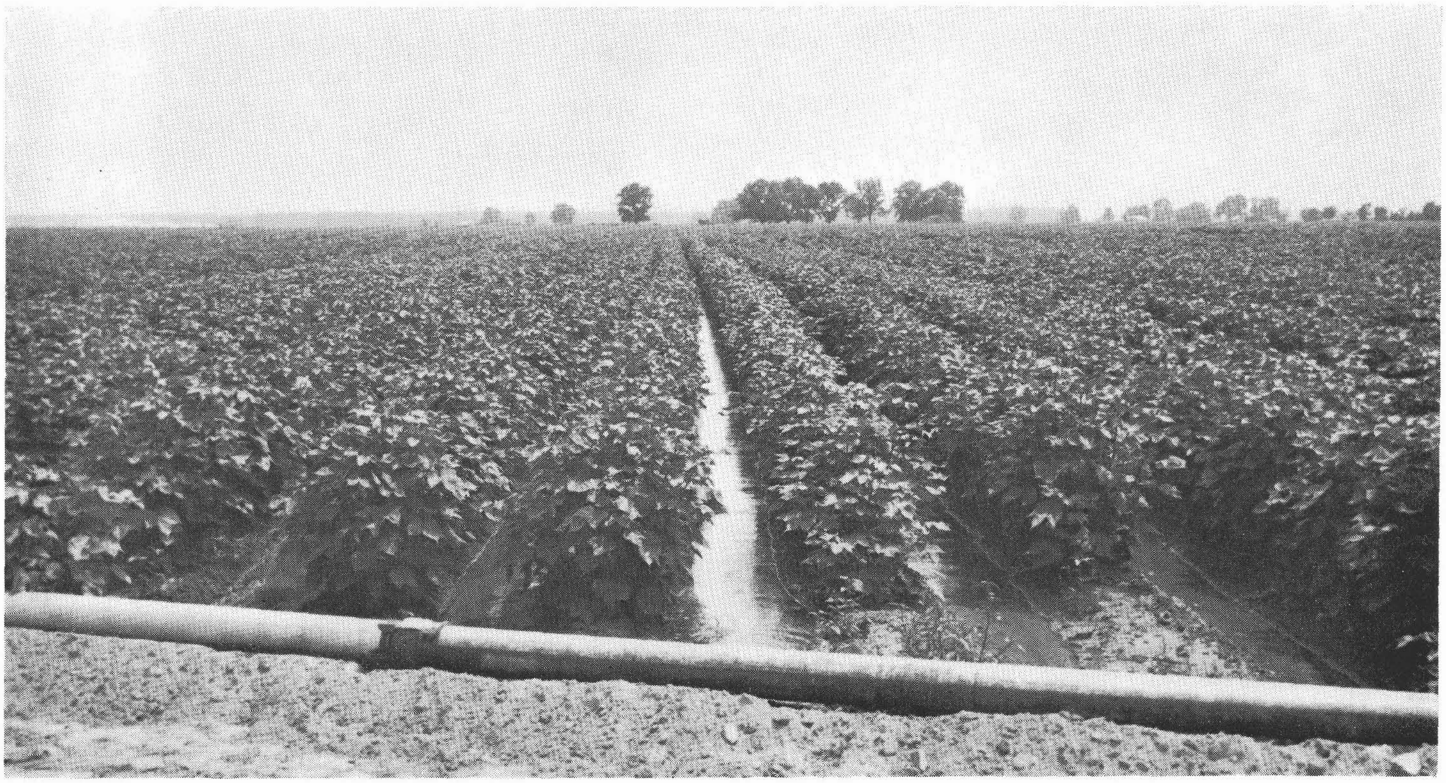

Figure 7.—**Furrow irrigation of cotton on Rilla silt loam, 0 to 1 percent slopes. Tilth is easy to maintain on this soil.**

These soils are very strongly acid to moderately alkaline in the root zone. Natural fertility is moderate to high, and the organic-matter content is moderate. Permeability is moderately slow or moderate, and the available water capacity is high.

Cotton (fig. 8), corn, soybeans, grain sorghum, and small grain are well suited. Truck crops, such as tomatoes, okra, and green beans, are also well suited. Suitable grasses include bermudagrass, dallisgrass, johnsongrass, bahiagrass, and tall fescue. Suitable legumes include vetch, lespedeza, alfalfa, crimson clover, and white clover.

These soils are easy to till. Erosion is a moderate hazard on long slopes. Field drains are needed in places to remove water that collects in the depressions on the undulating Commerce soils. Furrow irrigation is possible if the undulating areas are smoothed or graded. Under good management, including row arrangement parallel with the dominant slopes, clean-tilled crops that leave a large amount of residue can be grown year after year. Close-growing crops can be grown without special attention to row direction.

CAPABILITY UNIT IIw-1

This unit consists of somewhat poorly drained, level soils of the Hebert and McGehee series. These soils occur on low natural levees. They have a surface layer of silt loam. The subsoil is silt loam or silty clay loam, except in McGehee soils where the lower part is silty clay or clay.

These soils are medium acid to strongly acid in the root zone. Natural fertility is high, and the organic-matter content is moderate. Permeability is moderately slow or slow, and the available water capacity is high.

Rice, soybeans, cotton, grain sorghum, and small grain (fig. 9) are suitable cultivated crops. Suitable legumes include annual lespedeza, sericea lespedeza, white clover, alfalfa, and vetch. Suitable grasses include bermudagrass, tall fescue, and bahiagrass.

These soils are easy to till. Wetness is a moderate hazard and is the chief limitation. Grading and smoothing are needed for good drainage and efficient management of irrigation water in many fields. Under good management, cultivated crops that leave large amounts of residue can be grown year after year.

CAPABILITY UNIT IIIw-1

This unit consists of poorly drained to somewhat poorly drained, nearly level and undulating soils of the Bowdre, Desha, Newellton, Perry, Portland, Sharkey, and Tunica series. These soils occur in slack-water areas. They have a surface layer of silt loam or clay and a subsoil or underlying material of clay. In the Bowdre, Newellton, and Tunica soils, the clay is underlain by loamy material.

These soils are very strongly acid to mildly alkaline. Natural fertility is moderate to high, and the organic-matter content is moderate to high. Permeability is slow to very slow, and the available water capacity is high.

Rice, cotton, soybeans (fig. 10), grain sorghum, and small grain are suitable crops. Rice is grown chiefly in level areas. Suitable grasses include bermudagrass, tall fescue, and dallisgrass. Suitable legumes include white clover, vetch, and alfalfa.

Under good management that includes surface drainage, clean-tilled crops that produce a large amount of

Figure 8.—**Mature cotton on Rilla silt loam, 1 to 3 percent slopes. Yield from this field was about 725 pounds of cotton lint per acre.**

Figure 9.—Excellent crop of winter wheat on McGehee silt loam. After wheat is harvested in spring, soybeans are planted in the stubble.

residue can be grown year after year. The soils that have a loamy surface layer are easy to till. The clayey soils are difficult to till, and hard, persistent clods form if the soil is tilled when wet.

Growing rice (fig. 11) on these soils is risky unless there is an adequate drainage system that provides rapid removal of excess irrigation water and excess rainfall. A cropping system suitable for rice culture consists of 1 or 2 years of rice followed by 2 years of row crops that produce a large amount of residue. The other crops in the cropping system can be irrigated through the rice irrigation system.

CAPABILITY UNIT IIIs-1

Bruno loamy sand, gently undulating, is the only soil in this unit. This soil occurs on the higher parts of natural levees and near crevasses. It is excessively drained. The surface layer is loamy sand, and the material below is loamy fine sand to sand that contains a few thin layers of finer material.

This soil is medium acid to mildly alkaline. Natural fertility is low, and the organic-matter content is low. Permeability is moderate. The available water capacity is low, and the soil is droughty.

Winter small grain grows fairly well. Watermelons are well suited, but cotton and soybeans are poorly suited. Suitable grasses include coastal bermudagrass, common bermudagrass, and weeping lovegrass. Suitable legumes include sericea lespedeza and vetch.

Under good management, clean-tilled crops that leave a large amount of residue can be grown year after year.

Fall planted or early maturing crops are better suited than summer crops because of the droughtiness, excessive drainage, and rapid permeability.

CAPABILITY UNIT Vw-1

This unit consists of well-drained to poorly drained, frequently flooded, level to gently undulating soils of the Commerce, Coushatta, Desha, Newellton, Sharkey, and Tunica series. These soils occur on the unprotected areas between the levees and the rivers. The surface layer is clay to silt loam and is subject to change with each flooding. The subsoil and material below range from sandy loam to clay.

These soils are medium acid to moderately alkaline in the root zone. Natural fertility is high. Permeability is

Figure 10.—Soybeans on Perry clay. The poor stand in this late-planted field results from excess water during spring and early in summer.

Figure 11.—**Young rice on Sharkey clay in an area of Sharkey and Desha clays, 0 to 1 percent slopes. A drainage system is needed on this soil for cultivation of rice.**

very slow to moderately slow, and the available water capacity is high.

Frequent flooding is the major limitation on these soils (fig. 12). The soils cannot be safely used for cultivated crops unless major flood control works are installed. They are suited to pasture, woodland, and wildlife. Suitable grasses include bermudagrass, johnsongrass, tall fescue, and dallisgrass.

Predicted yields

Table 2 gives predicted yields per acre of the principal crops grown in this county. The predictions are based mainly on data supplied by farmers and those who work with farmers in Desha County. These yields are not the highest that can be obtained, but they are generally obtained by the following practices:

1. Using the proper equipment at the right time to prepare the soil, plant the crops, control weeds, and harvest the crops.
2. Following a systematic program for controlling insects and plant diseases.
3. Choosing crop varieties that are well suited to the soil and to the kind of farming operations.
4. Draining wet soils and irrigating crops.

Use of the Soils for Woodland [2]

Virgin forest covered all of Desha County before it was settled. The principal species of commercial value were bottom-land oaks, hickory, sweetgum, water tupelo, baldcypress, ash, sycamore, and pecan.

Overcutting, wildfire, and land clearing have reduced the woodland to about one-third of the acreage of the county. Except for about 27,000 acres in the White River National Wildlife Refuge, the woodland belongs to farmers and other private owners. Much of it is in poor condition.

The major obstacles to better woodland management are lack of markets, lack of owner interest in woodland management, the high cost of land, and suitability of much of the woodland for more intensive uses. The major physical problems in increasing production are the need to eliminate cull and weed trees, and the need for planting and seeding commercial species or encouraging the natural regeneration of these species.

[2] JAMES T. BEENE, woodland conservationist, Soil Conservation Service, helped prepare this section.

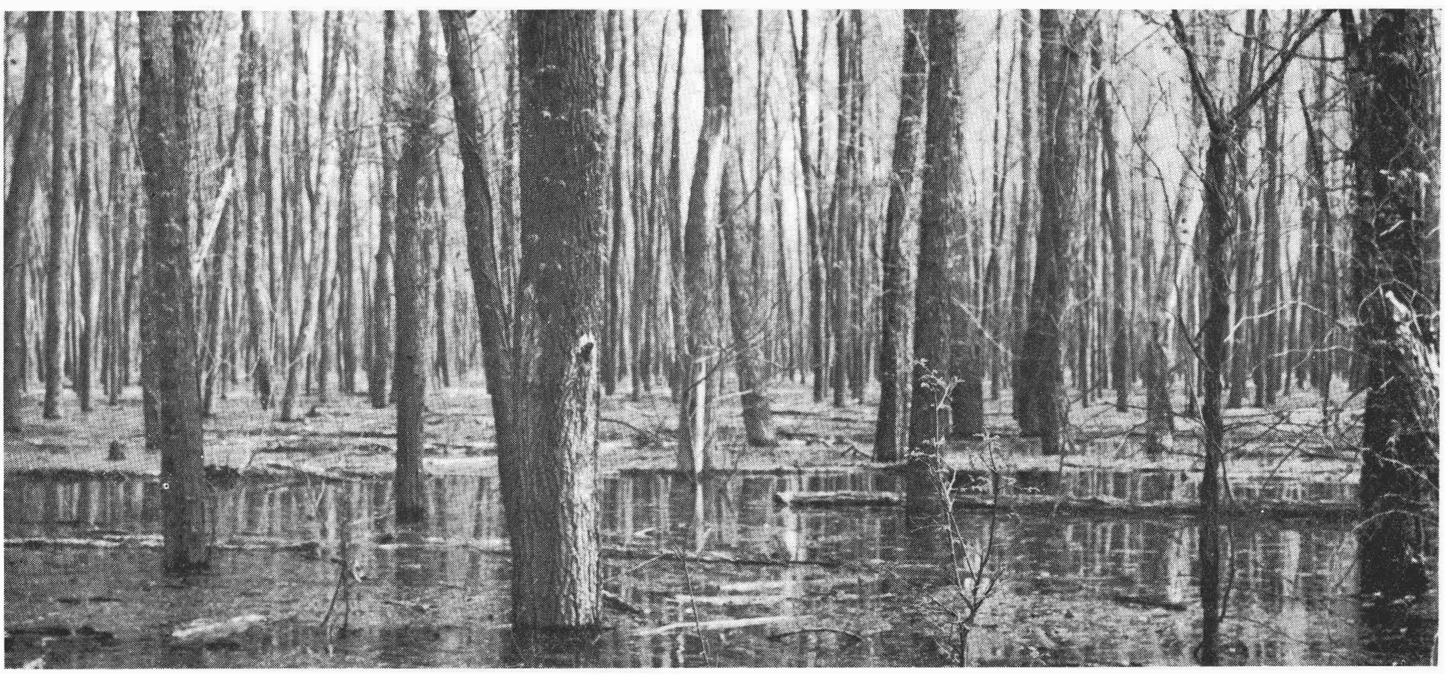

Figure 12.—**Typical spring flooding in an area of Sharkey-Commerce-Coushatta association, frequently flooded.**

TABLE 2.—*Predicted yields per acre of principal crops*

[These yields can be obtained under practices defined in the text; absence of a figure indicates the crop is unsuited or is not commonly grown]

Soil	Rice	Cotton	Soybeans	Wheat	Oats	Common bermudagrass	Coastal bermudagrass	Tall fescue
Bowdre, Desha, and Robinsonville soils, gently undulating:	*Bu.*	*Lb. of lint*	*Bu.*	*Bu.*	*Bu.*	*A.U.M.*[1]	*A.U.M.*[1]	*A.U.M.*[1]
Bowdre soils		575	35	35	55	8	9	9
Desha soils	90	525	35	35	50	7	9	9
Robinsonville soils		775	35	40	55	8. 5	10	8
Bruno loamy sand, gently undulating		325	14	20	40	3. 0	4. 5	
Commerce silt loam, 0 to 1 percent slopes		825	38	45	70	9	12	9
Commerce silt loam, gently undulating		825	38	45	65	9	12	9
Coushatta complex, 0 to 1 percent slopes		825	38	45	65	8. 5	12	9
Desha silt loam	90	525	35	35	50	7	9	9
Desha clay	90	525	35	35	50	7	9	9
Hebert silt loam	85	675	35	40	55	9	11	9
McGehee silt loam	85	675	35	40	55	9	11	9
Newellton clay, 0 to 1 percent slopes		600	35	35	55	8. 5	9. 5	9
Newellton clay, gently undulating		575	35	35	55	8	9	9
Perry silt loam	90	525	33	35	50	7	9	9
Perry clay	90	500	33	32	50	7	9	9
Portland silt loam	90	525	35	35	50	7	9	9
Portland clay	90	525	35	32	50	7	9	9
Rilla silt loam, 0 to 1 percent slopes		800	38	45	60	9	11	9
Rilla silt loam, 1 to 3 percent slopes		775	35	45	55	9	11	9
Sharkey clay	90	525	35	35	50	7	9	9
Sharkey-Commerce-Coushatta association, frequently flooded						7	9	9
Sharkey and Desha silt loams	90	525	35	35	50	7	9	9
Sharkey and Desha clays, 0 to 1 percent slopes	90	525	35	35	50	7	9	9
Sharkey and Desha clays, gently undulating	80	525	35	35	50	7	9	9
Tunica clay, 0 to 1 percent slopes		560	35	35	55	7	9	9
Tunica clay, 1 to 3 percent slopes		560	35	35	55	7	9	9
Tunica clay, frequently flooded			30			7	9	9
Tutwiler silt loam		800	35	45	60	9	11	9

[1] A.U.M. stands for animal-unit-month. The figures represent the number of months that 1 acre will provide grazing for one animal unit (one cow, steer, or horse, five hogs, or seven sheep) without injury to the pasture.

Table 3 gives information that can help owners and operators of woodland to establish, manage, and harvest tree crops. The information is based on detailed plot studies, measurements of different kinds of trees on different kinds of soils, published and unpublished records, and the experience and judgment of technicians who work with tree crops.

Management of woodland can be planned more effectively if soils are grouped under characteristics that affect growth and management of trees. The soils of Desha County have been assigned to six woodland suitability groups, which are described in table 3. Each group consists of soils that are about the same in suitability for wood crops, potential productivity, and management requirements. These factors depend on such soil characteristics as depth; arrangement of layers in the profile; texture, drainage, reaction, and consistence of each layer; and content of humus and minerals. To find the woodland group of a given soil, refer to the "Guide to Mapping Units."

Listed in table 3 is a brief description of each of the suitability groups that includes ratings of the soils for equipment limitations, seedling mortality, and potential productivity. Also given in the table are lists of the species to favor and species to plant, the site index for the key species in each group, and the average yearly growth per acre.

Equipment limitation refers to soil characteristics that restrict or prohibit the use of conventional equipment for planting, road construction, control of unwanted vegetation, harvesting of tree crops, and fire control. The limitations in Desha County are caused mainly by wetness and frequency and duration of flooding. The limitation is slight if the soils are loamy and at least moderately well drained, if they are not subject to frequent flooding or excessive surface water, and if the use of equipment is restricted for only a short period after a heavy rain. The limitation is moderate if the soils are not subject to frequent flooding or excessive surface water for extended periods, if the soils are sandy, and if equipment can be used from March to December. The limitation is severe if the use of equipment is limited to the driest months or to the periods between extended floods.

Seedling mortality refers to the expected loss of seedlings during the first two growing seasons after planting. Loss of seedlings in this county is caused mainly by excess water or droughtiness. Mortality is slight if less than 25 percent of planted seedlings die and natural regeneration ordinarily occurs. Mortality is moderate if between 25 and 50 percent of planted seedlings die, natu-

TABLE 3.—*Woodland suitability groups and wood crops*

Suitability group	Potential productivity: Species to favor	Potential productivity: Site index [1]	Potential productivity: Average yearly growth per acre [2]	Species to plant
			Board feet	
1o4. Well-drained, loamy soils that have very high potential productivity; no serious management problems; suited to southern hardwoods. (CoA; Robinsonville part of BdU. For Bowdre part of BdU, see group 2w5; for Desha part of BdU, see group 2w6)	Sweetgum,[3] green ash, cottonwood, sycamore, hackberry, elm, red oak, Shumard oak, water oak, black walnut, and persimmon.	96+	380+	Sycamore, cottonwood, green ash, sweetgum, cherrybark oak, water oak, black walnut, Shumard oak, and swamp chestnut oak.
1w5. Moderately wet, loamy soils that have very high potential productivity; moderate equipment limitations, primarily because of excess water; suited to southern hardwoods. (CmA; CmU)	Sweetgum,[3] baldcypress, black willow, cottonwood, elm, green ash, hackberry, Nuttall oak, pecan, black walnut, persimmon, Shumard oak, silver maple, sycamore, water oak, and cherrybark oak.	96+	380+	Cottonwood, Shumard oak, sweetgum, sycamore, cherrybark oak, and black walnut.
2o4. Well-drained, loamy soils that have high potential productivity; no serious management problems; suited to southern hardwoods. (RsA; RsB; Tw)	Water oak,[3] cherrybark oak, cottonwood, elm, green ash, hackberry, Nuttall oak, Shumard oak, swamp chestnut oak, pecan, sweetgum,black walnut, sycamore, and willow oak.	86–95	250–345	Cherrybark oak, cottonwood, green ash, Nuttall oak, Shumard oak, swamp chestnut oak, sweetgum, sycamore, water oak, willow oak, and black walnut.
2w5. Moderately wet, loamy and clayey soils that have high potential productivity; moderate equipment limitations and slight to moderate seedling mortality, primarily because of excess water; suited to southern hardwoods. (He; Mc; NeA; NeU)	Water oak,[3] cherrybark oak, cottonwood, elm, green ash, hackberry, Nuttall oak, overcup oak, pecan, black walnut, swamp chestnut oak, sweetgum, sycamore, willow oak, and persimmon.	86–95	250–345	Cherrybark oak, cottonwood, green ash, Nuttall oak, swamp chestnut oak, sweetgum, sycamore, water oak, willow oak, and Shumard oak.
2w6. Wet, clayey and loamy soils that have high potential productivity; severe equipment limitations, and moderate seedling mortality, primarily because of excess water; suited to southern hardwoods. (De; Dh; Pc; Pe; Po; Pr; Sh; Sharky part of Sm; Sr; SsA; SsU; TuA; TuB; Tv. For Commerce part of Sm, see group 1w5; for Coushatta part, see group 1o4)	Sweetgum,[3] cherrybark oak, cottonwood, elm, green ash, hackberry, Nuttall oak, swamp chestnut oak, sycamore, water oak, willow oak.	86–95	270–370	Cottonwood, green ash, Nuttall oak, swamp chestnut oak, sweetgum, sycamore, water oak.
2s5. Excessively drained, sandy soils that have high productivity; moderate equipment limitations and severe seedling mortality because of low available water capacity; suited to southern hardwoods. (BrU)	Sweetgum,[3] green ash, cottonwood, elm, hackberry, pecan, black walnut, sycamore, cherrybark oak, Shumard oak, swamp chestnut oak, water oak.	96+	380+	Cottonwood, sycamore, sweetgum, water oak, Shumard oak, cherrybark oak, swamp chestnut oak, green ash, black walnut.

[1] The site index ratings are adapted from data gathered in soil-site studies conducted by the Soil Conservation Service and the Forest Service.

[2] The yield data are computed under Doyle Rule for well-stocked, even-aged, managed stands: to age 30 for cottonwoods, and to age 60 for other species. Hardwood yields are adapted from published material on southern hardwoods *(10)* with tree growth data from soil-site evaluations by the Soil Conservation Service.

[3] Site index and average yearly growth per acre are for this species in this suitability group.

ral regeneration cannot be relied upon without site preparation, and replanting is necessary. Mortality is severe if more than 50 percent of the planted seedlings die, natural regeneration cannot be relied upon, and special site preparation and replanting are necessary.

The commercially important kinds of trees to favor in existing stands are listed under the heading "Potential productivity." The estimated site index and average yearly growth in board feet per acre are given for an indicator species for each group. Site index is based on the average height of the dominant trees in a stand, at age 30 for cottonwood, at age 35 for sycamore, and at age 50 for other species. The higher the site index, the higher the average yearly growth of wood crops. The site index ratings in table 3 are adapted from data gathered in soil-site studies by the Soil Conservation Service and the Forest Service (*8, 9, 12, 13*).

Under the heading "Species to plant" are listed the species of trees to choose for planting in establishing a stand. Species are selected on the basis of their growth and of the quality, value, and marketability of the tree products.

Use of the Soils for Wildlife [3]

The suitability of a soil for wildlife habitat depends on the kind of vegetation and cover the soil produces, and the availability of water. These factors are closely related to soil characteristics and land use. Water-holding characteristics of soils determine suitability for ponds and lakes. The fertility of impounded water is directly related to the fertility of the soil.

Wildlife habitat can be managed by planting choice food plants, by managing existing vegetation, and by locating water developments in areas where water is scarce. Information about the soils is useful for these purposes.

In table 4 the soils of Desha County are rated for their relative suitability for the establishment, improvement, or maintenance of habitat elements. These ratings refer only to the suitability of the soil and do not take into account the present use of the soil or the distribution of wildlife and human population. The suitability of individual sites must be determined by onsite inspection or intimate knowledge of the area.

The ratings given in table 4 are defined as—

> Well suited: habitat generally is easily created, improved, or maintained; the soil has few or no limitations that affect management; satisfactory results can be expected.
>
> Suited: habitat can be created, improved, or maintained in most places; the soil has moderate limitations that affect management; moderate intensity of management may be required for satisfactory results.
>
> Poorly suited: habitat can be created, improved, or maintained in most places; the soil has severe limitations; habitat management is difficult and expensive; results are not always satisfactory.
>
> Unsuited: impractical or impossible to create or maintain habitat; unsatisfactory results are probable.

[3] ROY A. GRIZZELL, JR., biologist, Soil Conservation Service, helped prepare this section.

The column heading "Grain and seed crops" refers to such annual crop plants as wheat, rice, sorghum, millet, and soybeans.

"Grasses and legumes" refers to domestic grasses and legumes that can be established by plantings and that furnish food and cover for wildlife. The grasses include bahiagrass, tall fescue, ryegrass, and panicgrass. The legumes include clover, annual lespedeza, and bush lespedeza.

"Wild herbaceous plants" refers to native or introduced perennial grasses, forbs, and weeds that provide food and cover for wildlife. Examples of these are tickclover, perennial lespedeza, pokeberry, and cheatgrass.

"Hardwood trees and shrubs" refers to nonconiferous trees, shrubs, and woody vines that produce fruit, nuts, buds, catkins, or foliage used extensively as food by wildlife. These plants commonly are established naturally, but they can be planted. They include oak, hickory, cherry, dogwood, maple, grape, honeysuckle, and greenbrier.

"Wetland food and cover plants" are annual and perennial wild herbaceous plants that grow on moist to wet sites, but do not include submersed or floating aquatic plants. Smartweed, wild millet, spikerush and other rushes, sedges, burreed, and bull paspalum furnish food and cover for wetland wildlife.

"Shallow water developments" refers to low dikes and water control structures established to create habitat principally for waterfowl. They may be designed to be drained, planted to crops and flooded, or they may be permanent impoundments used to grow submersed aquatic plants.

"Ponds" are locations where water of suitable depth and quality can be impounded for fish.

"Openland wildlife" are quail, doves, cottontail rabbits, foxes, meadowlarks, field sparrows, and other birds and mammals that normally live in cropland, pasture, meadow, lawns, and in other openland areas where grasses, herbs, and shrubby plants grow.

"Woodland wildlife" are woodcocks, thrushes, vireos, squirrels, deer, raccoons, wild turkey, and other birds and mammals that normally live in wooded areas where hardwood trees and shrubs and coniferous trees grow.

"Wetland wildlife" are ducks, geese, rails, herons, shore birds, mink, muskrat, and other birds and mammals that normally live in wet areas, marshes, and swamps.

Engineering Uses of the Soils [4]

This section provides information of special interest to engineers, contractors, farmers, and others who use soil as structural material or as foundation material upon which structures are built. Considered in this section are those soil properties that affect construction and maintenance of roads and airports, pipelines, building foundations, water storage facilities, sewage disposal systems, and irrigation and drainage systems. Among the soil properties most important in engineering are permeability, shear strength, density, shrink-swell potential, available water capacity, grain-size distribution, plasticity, and reaction.

Information concerning these and related soil properties are furnished in tables 5, 6, and 7.

[4] WILLIAM E. ARNOLD, civil engineer, Soil Conservation Service, helped prepare this section.

TABLE 4—*Suitability of the soils for elements*

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees and shrubs
Bowdre: BdU	Suited	Suited	Suited	Well suited
For Desha part of BdU, see Desha series; for Robinsonville part, see Robinsonville series.				
Bruno: BrU	Poorly suited	Poorly suited	Poorly suited	Poorly suited
Commerce:				
CmA, CmU	Well suited	Well suited	Well suited	Well suited
In frequently flooded areas	Poorly suited	Suited	Suited	Well suited
Coushatta:				
CoA	Well suited	Well suited	Well suited	Well suited
In frequently flooded areas	Poorly suited	Suited	Suited	Well suited
Desha:				
De, Dh	Suited	Suited	Suited	Well suited
In frequently flooded areas	Poorly suited	Suited	Suited	Well suited
Hebert: He	Well suited	Well suited	Well suited	Well suited
McGehee: Mc	Well suited	Well suited	Well suited	Well suited
Newellton:				
NeA, NeU	Suited	Suited	Suited	Well suited
In frequently flooded areas	Poorly suited	Suited	Suited	Well suited
Perry: Pc, Pe	Suited	Suited	Suited	Well suited
Portland: Po, Pr	Suited	Suited	Suited	Well suited
Rilla: RsA, RsB	Well suited	Well suited	Well suited	Well suited
Robinsonville (Mapped only in an undifferentiated group with Bowdre and Desha soils.)	Well suited	Well suited	Well suited	Well suited
Sharkey:				
Sh, Sm, Sr, SsA, SsU	Suited	Suited	Suited	Well suited
In frequently flooded areas	Poorly suited	Suited	Suited	Well suited
For Commerce part of Sm, see Commerce series; for Coushatta part, see Coushatta series; for Desha part of Sr, SsA, and SsU, see Desha series.				
Tunica:				
TuA, TuB, Tv	Suited	Suited	Suited	Well suited
In frequently flooded areas	Poorly suited	Suited	Suited	Well suited
Tutwiler: Tw	Well suited	Well suited	Well suited	Well suited

of wildlife habitat and kinds of wildlife

Elements of wildlife habitat—Continued			Kinds of wildlife		
Wetland food and cover plants	Shallow water developments	Ponds	Openland	Woodland	Wetland
Suited	Suited	Well suited	Suited	Well suited	Suited.
Unsuited	Unsuited	Unsuited	Poorly suited	Poorly suited	Unsuited.
Suited	Suited	Suited	Well suited	Well suited	Suited.
Suited	Poorly suited	Unsuited	Suited	Suited	Suited.
Unsuited	Unsuited	Poorly suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Suited	Suited	Unsuited.
Suited	Well suited	Well suited	Suited	Well suited	Suited.
Suited	Poorly suited	Unsuited	Suited	Suited	Suited.
Suited	Suited	Suited	Well suited	Well suited	Suited.
Suited	Well suited	Well suited	Well suited	Well suited	Suited.
Suited	Suited	Suited	Suited	Well suited	Suited.
Suited	Poorly suited	Unsuited	Poorly suited	Suited	Suited.
Well suited	Well suited	Well suited	Suited	Well suited	Well suited.
Suited	Well suited	Well suited	Suited	Well suited	Suited.
Unsuited	Unsuited	Suited	Well suited	Well suited	Unsuited.
Unsuited	Unsuited	Unsuited	Well suited	Well suited	Unsuited.
Well suited	Well suited	Well suited	Suited	Well suited	Well suited.
Suited	Poorly suited	Unsuited	Poorly suited	Suited	Suited.
Well suited	Well suited	Well suited	Suited	Well suited	Well suited.
Suited	Poorly suited	Unsuited	Poorly suited	Suited	Suited.
Unsuited	Unsuited	Poorly suited	Well suited	Well suited	Unsuited.

TABLE 5.—*Estimated*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification: USDA texture
	Feet	*Inches*	
Bowdre: BdU	0.5–1.5	0–18	Silty clay and clay
For Desha and Robinsonville parts, see those series.		18–30	Silt loam
		30–50	Fine sandy loam
Bruno: BrU	4.0–6.0	0–5	Loamy sand
		5–28	Sand
		28–64	Silt loam
		64–72	Silty clay
Commerce: CmA, CmU	1.0–2.0	0–72	Silt loam
Coushatta: CoA	4.0–5.0	0–23	Silty clay loam
For Bowdre, Bruno, and Desha parts, see those series.		23–80	Silt loam
Desha:			
De	0.5–1.0	0–8	Silt loam
		8–72	Clay
Dh	0.5–1.0	0–72	Clay
Hebert: He	0.5–1.0	0–53	Silt loam
		53–72	Silt loam
McGehee: Mc	0.5–1.5	0–7	Silt loam
		7–16	Silty clay loam
		16–72	Silty clay and clay
Newellton: NeA, NeU	0.5–1.0	0–15	Silty clay and clay
		15–36	Silt loam
		36–86	Fine sandy loam
Perry:			
Pc	0–0.5	0–8	Silt loam
		8–41	Clay
		41–72	Clay
Pe	0–0.5	0–41	Clay
		41–72	Clay
Portland:			
Po	0.5–1.0	0–6	Silt loam
		6–34	Clay
		34–72	Clay
Pr	0.5–1.0	0–6	Clay
		6–34	Clay
		34–72	Clay
Rilla: RsA, RsB	4.0–6.0	0–8	Silt loam
		8–30	Silty clay loam
		30–72	Silt loam
Robinsonville	4.0–6.0	0–6	Silt loam
Mapped only in an undifferentiated group with Bowdre and Desha soils.		6–31	Fine sandy loam
		31–50	Silt loam
Sharkey:			
Sh, Sm, SsA, SsU	0–0.5	0–80	Clay
For Commerce and Coushatta parts of Sm and for Desha part of SsA and SsU, see those series.			
Sr	0–0.5	0–7	Silt loam
For Desha part of Sr, see Desha series.		7–80	Clay

See footnote at end of table.

properties

Classification—Continued		Percentage passing sieve—		Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
				Inches per hour	*Inches per inch of soil*	*pH value*	
CH	A–7	100	95–100	0. 06–0. 2	0. 18–0. 20	6. 1–7. 8	High.
ML or CL	A–4	100	70–90	0. 2–0. 63	0. 21–0. 23	6. 1–7. 8	Low.
SM or ML	A–2 or A–4	80–100	30–55	0. 63–2. 0	0. 13–0. 16	6. 1–7. 8	Low.
SM	A–2	[1] 50–75	15–30	2. 0–6. 3	0. 06–0. 10	5. 6–7. 8	Low.
SM	A–2	[1] 50–70	10–20	>6. 3	0. 02–0. 06	5. 6–7. 8	Low.
ML or CL	A–4	100	70–90	0. 63–2. 0	0. 21–0. 23	5. 6–7. 8	Low.
CH	A–7	100	95–100	0. 06–0. 2	0. 18–0. 20	5. 6–7. 8	High.
ML or CL	A–4 or A–6	95–100	95–100	0. 2–0. 63	0. 21–0. 23	6. 1–8. 4	Low.
CL or CH	A–6 or A–7	95–100	90–100	0. 2–0. 63	0. 20–0. 22	6. 1–7. 8	Moderate.
ML or CL	A–4 or A–6	90–100	80–95	0. 2–0. 63	0. 21–0. 23	6. 1–7. 8	Low.
ML or CL	A–4 or A–6	95–100	80–95	0. 2–0. 63	0. 21–0. 23	6. 1–7. 3	Low.
CH	A–7	100	95–100	<0. 06	0. 18–0. 20	6. 6–7. 8	High.
CH	A–7	100	95–100	<0. 06	0. 18–0. 20	6. 1–7. 8	High.
ML or CL	A–4	95–100	80–95	0. 2–0. 63	0. 21–0. 23	5. 1–6. 0	Low.
ML or CL	A–4 or A–6	95–100	80–95	0. 2–0. 63	0. 21–0. 23	6. 1–7. 8	Low.
ML or CL	A–4	95–100	80–95	0. 2–0. 63	0. 21–0. 23	5. 1–6. 0	Low.
CL or CH	A–6 or A–7	95–100	90–100	0. 2–0. 63	0. 20–0. 22	5. 1–6. 0	Moderate.
CH	A–7	100	95–100	0. 06–0. 2	0. 18–0. 20	6. 1–8. 4	High.
CH	A–7	100	85–95	0. 06–0. 2	0. 18–0. 20	5. 6–7. 8	High.
ML or CL	A–4 or A–6	95–100	70–95	0. 2–0. 63	0. 21–0. 23	6. 1–7. 8	Low.
SM or ML	A–4	90–100	40–60	0. 63–2. 0	0. 16–0. 18	6. 1–7. 8	Low.
ML or CL	A–4	95–100	80–95	0. 2–0. 63	0. 21–0. 23	4. 5–6. 5	Low.
CH	A–7	100	95–100	<0. 06	0. 18–0. 20	4. 5–6. 5	High.
CH	A–7	100	95–100	<0. 06	0. 18–0. 20	6. 5–7. 8	High.
CH	A–7	100	95–100	<0. 06	0. 18–0. 20	4. 5–6. 5	High.
CH	A–7	100	95–100	<0. 06	0. 18–0. 20	6. 5–7. 8	High.
ML or CL	A–4	95–100	80–95	0. 2–0. 63	0. 21–0. 23	5. 1–6. 5	Low.
CH	A–7	100	95–100	<0. 06	0. 18–0. 20	4. 5–5. 5	High.
CH or MH	A–7	100	90–100	<0. 06	0. 18–0. 20	7. 4–8. 4	High.
CH	A–7	100	90–100	0. 06–0. 2	0. 18–0. 20	5. 1–6. 5	High.
CH	A–7	100	95–100	<0. 06	0. 18–0. 20	4. 5–5. 5	High.
CH or MH	A–7	100	90–100	<0. 06	0. 18–0. 20	7. 4–8. 4	High.
ML or CL	A–4	95–100	85–100	0. 63–2. 0	0. 21–0. 23	5. 1–6. 5	Low.
CL or CH	A–6 or A–7	95–100	90–100	0. 2–0. 63	0. 20–0. 22	4. 5–6. 0	Moderate.
ML or CL	A–4	95–100	85–100	0. 2–0. 63	0. 21–0. 23	4. 5–6. 0	Low.
ML or CL	A–4	95–100	70–95	0. 63–2. 0	0. 21–0. 23	6. 1–7. 8	Low.
SM or ML	A–4	80–100	40–60	0. 63–2. 0	0. 13–0. 16	6. 1–7. 8	Low.
ML or CL	A–4	95–100	70–95	0. 63–2. 0	0. 21–0. 23	6. 1–7. 8	Low.
CH	A–7	95–100	95–100	<0. 06	0. 18–0. 20	6. 1–7. 8	High.
ML or CL	A–4 or A–6	95–100	85–100	0. 2–0. 63	0. 21–0. 23	6. 1–7. 8	Low.
CH	A–7	95–100	95–100	<0. 06	0. 18–0. 20	6. 1–7. 8	High.

TABLE 5.—*Estimated*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification
			USDA texture
	Feet	*Inches*	
Tunica: TuA, TuB, Tv	0–0.5	0–24	Clay and silty clay
		24–38	Silty clay loam
		38–45	Silt loam
		45–72	Loamy sand
Tutwiler: Tw	4.0–6.0	0–6	Silt loam
		6–18	Loam
		18–39	Silt loam
		39–50	Loam and fine sandy loam
		50–55	Silt loam
		55–72	Silty clay

[1] 100 percent passed the No. 10 sieve.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
Bowdre: BdU. For Desha and Robinsonville parts, see those series.	Poor: clayey to depth of 18 inches.	Fair below depth of 18 inches	Seasonal high water table; high shrink-swell potential; low traffic-supporting capacity; somewhat poorly drained to depth of 18 inches.
Bruno: BrU	Poor: sandy material	Fair: poorly graded	Features generally favorable
Commerce: CmA, CmU	Good	Fair: moderate traffic-supporting capacity; somewhat poorly drained.	Somewhat poorly drained; seasonal high water table; moderate traffic-supporting capacity; flooding in some areas.
Coushatta: CoA. For Bowdre, Bruno, and Desha parts, see those series.	Good	Fair: moderate traffic-supporting capacity; moderate shrink-swell potential.	Moderate traffic-supporting capacity; moderate shrink-swell potential; flooding in some areas.
Desha: De, Dh	Poor: clayey material	Poor: low traffic-supporting capacity; high shrink-swell potential; clayey material.	Low traffic-supporting capacity; high shrink-swell potential; somewhat poorly drained; seasonal high water table; flooding in some areas.
Hebert: He	Good	Fair: moderate traffic-supporting capacity; somewhat poorly drained.	Seasonal high water table; somewhat poorly drained; moderate traffic-supporting capacity.

See footnote at end of table.

properties—Continued

Classification—Continued		Percentage passing sieve—		Permeability	Available water capacity	Reaction	Shrink-swell potential
Unified	AASHO	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				
				Inches per hour	*Inches per inch of soil*	*pH value*	
CH or CH–MH	A–7	95–100	95–100	<0.06	0.18–0.20	5.6–7.3	High.
CL or ML–CL	A–6 or A–7	95–100	95–100	0.2–0.63	0.20–0.22	5.6–7.3	Moderate.
ML or CL	A–4 or A–6	90–100	80–95	0.63–2.0	0.21–0.23	5.6–7.3	Low.
SM	A–2	80–100	15–30	2.0–6.3	0.06–0.10	5.6–7.3	Low.
ML	A–4	95–100	80–95	0.63–2.0	0.21–0.23	6.1–7.5	Low.
ML	A–4	95–100	70–85	0.63–2.0	0.15–0.18	6.1–7.5	Low.
ML	A–4	95–100	80–95	0.63–2.0	0.21–0.23	5.1–6.5	Low.
SM or ML	A–4	95–100	40–55	0.63–2.0	0.15–0.18	5.1–6.0	Low.
ML	A–4	95–100	80–95	0.63–2.0	0.21–0.23	5.1–6.0	Low.
CH	A–7	95–100	90–100	0.06–0.2	0.18–0.20	6.1–7.8	High.

interpretations

Soil features affecting—Continued					
Dikes, levees, and reservoir embankments	Reservoir area	Agricultural drainage	Irrigation	Winter grading [1]	Land leveling
Low stability to depth of 18 inches; medium stability below depth of 18 inches; subject to piping.	Moderately slow to moderate permeability below depth of 18 inches.	Slow permeability to depth of 18 inches; seasonal high water table; somewhat poorly drained.	Slow intake rate; cracks when dry.	Clayey to depth of 18 inches; seasonal high water table.	Seasonal high water table; clayey to depth of 18 inches; somewhat poorly drained.
Medium stability; subject to piping; rapid permeability.	Rapid permeability.	Excessively drained	Low available water capacity; rapid intake rate.	Features generally favorable.	Sandy material; low available water capacity; low fertility.
Medium stability; medium compressibility; subject to piping.	Moderately slow permeability.	Seasonal high water table; somewhat poorly drained.	Features generally favorable.	Somewhat poorly drained; seasonal high water table.	Seasonal high water table.
Medium stability; medium compressibility; fair compaction characteristics.	Moderately slow permeability; moderate lateral seepage possible.	Well drained	Moderately slow intake rate.	Moderately plastic	Features generally favorable.
High shrink-swell potential; medium stability; high compressibility.	Features generally favorable.	Very slow permeability; seasonal high water table; somewhat poorly drained.	Very slow intake rate; cracks when dry.	Somewhat poorly drained; clayey material; seasonal high water table.	Clayey material; seasonal high water table.
Medium stability; medium compressibility; subject to piping.	Moderately slow permeability.	Somewhat poorly drained; seasonal high water table; moderately slow permeability.	Moderately slow intake rate.	Seasonal high water table; somewhat poorly drained.	Seasonal high water table.

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TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—		Soil features affecting—
	Topsoil	Road fill	Highway location
McGehee: Mc	Fair: clayey below depth of 16 inches.	Poor: low traffic-supporting capacity; high shrink-swell potential below depth of 16 inches.	Somewhat poorly drained; seasonal high water table; high shrink-swell potential below depth of 16 inches; low traffic-supporting capacity.
Newellton: NeA, NeU	Poor: clayey material to depth of 15 inches; good below the clayey material.	Poor to depth of 15 inches: clayey material; high shrink-swell potential; somewhat poorly drained. Fair below depth of 15 inches: moderate to low traffic-supporting capacity.	High shrink-swell potential to depth of 15 inches; seasonal high water table; somewhat poorly drained; moderate to low traffic-supporting capacity; some areas flooded.
Perry: Pc, Pe	Poor: clayey material	Poor: clayey material; high shrink-swell potential; low traffic-supporting capacity; poorly drained.	Poorly drained; high shrink-swell potential; seasonal high water table; low traffic-supporting capacity.
Portland: Po, Pr	Poor: clayey material	Poor: clayey material; low traffic-supporting capacity; high shrink-swell potential.	High shrink-swell potential; seasonal high water table; low traffic-supporting capacity.
Rilla: RsA, RsB	Good	Fair: moderate shrink-swell potential; moderate traffic-supporting capacity.	Moderate traffic-supporting capacity; moderate shrink-swell potential.
Robinsonville Mapped only in an undifferentiated group with Bowdre and Desha soils.	Good	Fair: moderate traffic-supporting capacity.	Moderate traffic-supporting capacity.
Sharkey: Sh, Sm, Sr, SsA, SsU. For Commerce and Coushatta part of Sm, and for Desha part of Sr, SsA, SsU, see those series.	Poor: clayey material	Poor: clayey material; high shrink-swell potential; low traffic-supporting capacity; poorly drained.	Poorly drained; high shrink-swell potential; low traffic-supporting capacity; seasonal high water table; flooding in some areas.
Tunica: TuA, TuB, Tv	Poor: clayey material	Poor: clayey material in upper part of profile; high shrink-swell potential; low traffic-supporting capacity; poorly drained.	Poorly drained; seasonal high water table; flooding in some areas; clayey material in upper part of profile; high shrink-swell potential; low traffic-supporting capacity.
Tutwiler: Tw	Good	Fair: moderate traffic-supporting capacity.	Moderate traffic-supporting capacity.

[1] Suitability for grading in any wet season is the same as for grading in winter.

interpretations—Continued

Soil features affecting—Continued					
Dikes, levees, and reservoir embankments	Reservoir area	Agricultural drainage	Irrigation	Winter grading [1]	Land leveling
Material below depth of 16 inches has high shrink-swell potential; medium stability; medium to high compressibility.	Features generally favorable.	Slow permeability; seasonal high water table; somewhat poorly drained.	Slow intake rate below depth of 16 inches.	Somewhat poorly drained; seasonal high water table; clayey below depth of 16 inches.	Seasonal high water table; clayey below depth of 16 inches.
Low stability to depth of 15 inches; medium stability and subject to piping below depth of 15 inches.	Moderate seepage rate below depth of 15 inches.	Slow permeability; seasonal high water table; somewhat poorly drained.	Slow intake rate; cracks when dry.	Clayey material to depth of 15 inches; seasonal high water table; somewhat poorly drained.	Seasonal high water table; clayey material to depth of 15 inches.
High shrink-swell potential; low stability; poor compaction characteristics; high compressibility.	Features generally favorable.	Very slow permeability; seasonal high water table; poorly drained.	Very slow intake rate; cracks when dry.	Poorly drained; clayey material; seasonal high water table.	Seasonal high water table; clayey material; poorly drained.
High shrink-swell potential; low stability; high compressibility; poor compaction characteristics.	Features generally favorable.	Very slow permeability; seasonal high water table; somewhat poorly drained.	Very slow intake rate; cracks when dry.	Somewhat poorly drained; clayey material; seasonal high water table.	Seasonal high water table; clayey material.
Moderately slow permeability; subject to piping; moderate compressibility.	Moderately slow permeability.	Well drained	Features generally favorable.	Features generally favorable.	Features generally favorable.
Medium stability; moderate compressibility; subject to piping.	Moderate permeability.	Well drained	Features generally favorable.	Features generally favorable.	Features generally favorable.
High shrink-swell potential; low stability; poor compaction characteristics; high compressibility.	Features generally favorable.	Very slow permeability; seasonal high water table; poorly drained.	Very slow intake rate; cracks when dry.	Poorly drained; clayey material; seasonal high water table.	Seasonal high water table; clayey material; poorly drained.
High shrink-swell potential; low stability; material below depth of 2 to 3 feet subject to piping.	Moderate to rapid permeability below depth of 2 to 3 feet.	Very slow permeability to depth of 2 to 3 feet; seasonal high water table; poorly drained.	Very slow intake rate; cracks when dry.	Clayey material; poorly drained; seasonal high water table.	Seasonal high water table; clayey material; poorly drained.
Medium stability; moderate compressibility; subject to piping.	Moderate permeability to depth of 4 to 8 feet.	Well drained	Features generally favorable.	Features generally favorable.	Features generally favorably.

TABLE 7.—*Engineering test data*

[Tests performed by Arkansas State Highway Department, Division of Materials and Tests]

Soil name and location	Parent material	Arkansas SCS report No. S-66-Ark.	Depth from surface	Moisture-density[1] Maximum dry density	Moisture-density[1] Optimum moisture	Mechanical analysis[2] Percentage passing sieve— No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Liquid limit	Plasticity index	Classification AASHO[3]	Classification Unified[4]
			In.	*Lb./cu. ft.*	*Pct.*				*Pct.*			
Commerce silt loam (modal): NW¼SW¼NW¼ sec. 7, T. 7 S., R. 2 E.	Recent alluvium.	21-1-3	14-22	106	18	------	100	96	36	12	A-6(9)	CL
		21-1-6	39-55	105	18	100	99	97	30	5	A-4(8)	ML
		21-1-8	68-72	101	20	------	100	96	48	26	A-7-6(18)	CL
Newellton clay (modal): NE¼SW¼NW¼ sec. 17, T. 7 S., R. 1 E.	Recent alluvium.	21-3-2	5-15	92	25	------	100	89	62	32	A-7-5(24)	CH
		21-3-3	15-22	107	18	------	100	74	29	7	A-4(8)	CL
Tunica clay (modal): SW¼NW¼NW¼ sec. 20, T. 7 S., R. 1 E.	Recent alluvium.	21-2-2	5-24	87	30	------	100	99	78	42	A-7-5(32)	CH-MH[5]
		21-2-3	24-38	101	22	------	100	98	43	18	A-7-6(13)	ML-CL
		21-2-5	45-72	109	15	------	100	21	------	(6)	A-2-4(0)	SM

[1] Based on AASHO Designation: T-99-57, Method A (*1*).

[2] Mechanical analysis according to AASHO designation: T-88. Results by this procedure frequently differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service. In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data reported in this table are not suitable for use in naming textural classes for soil.

[3] Based on AASHO Designation: M 145-66 I.

[4] Based on the Unified Soil Classification System, Tech. Memo. No. 3-357, v. 1 (*15*).

[5] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from A-line are to be given a borderline classification. An example of a borderline classification obtained by this use is CH-MH.

[6] Nonplastic.

The estimates and interpretations of soil properties in these tables can be used in:

1. Planning and designing agricultural drainage systems, farm reservoirs, irrigation systems, and other structures for controlling water and conserving soil.
2. Selecting potential locations for highways, airports, pipelines, and underground cables.
3. Locating possible sources of sand or gravel suitable for use as construction material.
4. Selecting potential industrial, residential, and recreational areas.

The engineering interpretations reported here do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where excavations are deeper than the depths of layers here reported. In addition, in any given area other soils included in mapping may affect local application of a specific practice. Even in these situations, however, the soil map is useful in planning more detailed field investigations and for indicating the kinds of problems that may be expected.

Some terms used by soil scientists may be unfamiliar to engineers, and some words, for example, clay, silt, and sand, have different meanings in soil science than they have in engineering. These and other terms are defined in the Glossary.

Engineering classification systems

The two systems most commonly used in classifying soils for engineering purposes are the AASHO (*1*) system adopted by the American Association of State Highway Officials, and the Unified system (*15*) used by the Soil Conservation Service, Department of Defense, and others.

The AASHO system is used to classify soils according to those properties that affect use in highway construction. In this system, a soil is placed in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation) and, at the other extreme, clay soils that have low strength when wet. The best soils for subgrade are therefore classified as A–1, the next best A–2, and so on to class A–7, the poorest soils for subgrade.

Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. If soil material is near a classification boundary, it is given a symbol showing both classes, for example, A–2 or A–4. Within each group, the relative engineering value of a soil material can be indicated by a group index number. There is no upper limit of group index values obtained by the formula used in AASHO Designation M 145–66 I. Under average conditions of good drainage and thorough compaction, the supporting value of a material may be assumed as an inverse ratio to its group index. A group index of 0 indicates a good subgrade material, and a group index of 20 or more indicates a very poor subgrade material. The AASHO classification for tested soils, with index numbers in parentheses, is shown in table 7. The estimated classification for all soils mapped in the county is given in table 5.

In the Unified system, soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content. In this system, soils are identified as coarse grained (GW, GP, GM, GC, SW, SP, SM, and SC); fine grained (ML, CL, OL, MH, CH, and OH); and highly organic (Pt). Soils on the borderline between two classes are designated by symbols for both classes, for example, CH–MH.

Estimated properties

Table 5 gives estimates of soil properties important in engineering. The estimates are based on field classification and descriptions, test data given in table 7, test data from comparable soils in adjacent areas, and on detailed experiments in working with the individual kinds of soils in Desha County. The depth to bedrock is not given in table 5, because bedrock is generally at a depth of more than 150 feet and is thus not a factor in construction work.

USDA texture is determined by the relative proportions of sand, silt, and clay in soil material.

Permeability, as used in this table, refers only to movement of water downward through undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of the soil. Plowpans, surface crusts, and other properties resulting from use of the soils were not considered.

Available water capacity is that amount of capillary water in the soil available for plant growth after all free water has drained away.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH value and relative terms used to describe soil reaction are given in the Glossary.

Shrink-swell potential is an indication of the volume change to be expected with changes in moisture content. Shrinking and swelling of soils causes much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates hazards to the maintenance of structures constructed in, on, or with such materials. Clayey soils, such as those of the Desha, Perry, Portland, and Sharkey series, are very unstable and serve poorly as foundations for structures.

The soils that have clayey layers over loamy material, such as those of the Bowdre, Newellton, and Tunica series, present difficulties in the maintenance of drainage ditches. Where ditches extend into the loamy material, the material tends to slough because of undercutting or lateral seepage into the ditch.

Gravel in useful quantities is not found in this county. Sand occurs under the high banks of bayous and in old streambeds, but it contains excessive fines. There are no natural sources of good-quality aggregate.

Engineering interpretations

Table 6 contains information useful to engineers and others who plan to use soil material in construction of highways, farm facilities, buildings, and sewage disposal systems. Detrimental or undesirable features are emphasized, but very important desirable features are also given. The ratings and other interpretations in this table are based on information in table 5; on available test data, including those in table 7; and on field experience. Although the information applies only to soil depths indicated in the table, it is reasonably reliable to a depth of about 6 feet for most soils, and several more feet for some.

Topsoil is a term used to designate a fertile soil or soil material, ordinarily rich in organic-matter content, used as a topdressing for lawns, gardens, and roadbanks. The ratings indicate suitability for such use.

Road fill is material used to build embankments. The ratings indicate performance of soil material moved from borrow areas for this purpose.

Highway location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. The soil features, favorable as well as unfavorable, are the principal ones that affect geographic location of highways. These features include depth to the seasonal water table, drainage, shrink-swell potential, and traffic-supporting capacity.

Dikes, levees, and reservoir embankments are low structures designed to impound or divert water. The soil features are those that affect use of the soil as material for constructing low dikes, levees, and reservoir embankments. These features include stability, compressibility, shrink-swell potential, and susceptibility to piping.

Farm pond reservoir areas are affected mainly by seepage loss of water; thus, the most important feature is permeability of the soil at the sides of the excavation and below the excavated depth.

Agricultural drainage is affected by the depth to the water table and the rate of permeability. Use of tile drainage is not feasible in this county, and surface drainage (fig. 13) is necessary on many of the soils.

Irrigation is essential for some crops grown in the county, and supplementary irrigation is beneficial to many. Slope and rate of infiltration are the most common factors that affect irrigation. Good-quality irrigation water is obtained from wells about 90 feet deep and from surface water stored in reservoirs. The reservoirs are enclosed on all sides by earthen embankments and are

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Figure 13.—**A newly constructed drainage ditch that shows a shaped spoil bank. The soil is Perry clay.**

filled by water pumped from wells or surface sources. City water supplies are obtained from wells more than 200 feet deep.

Winter grading is affected chiefly by soil features that are relevant to moving, mixing, and compacting soil in roadbuilding work when the temperature is below freezing or when the soil material is wet. The important features are natural drainage, depth to the seasonal water table, and clayey soil material.

Land leveling is affected by the slope, depth of topsoil, topography, and rate of infiltration.

Engineering test data

In table 7 the results of engineering tests performed by the Arkansas State Highway Department are given for selected soils in Desha County. The table shows the location where the sample was taken, the depth of sampling, the data resulting from mechanical analysis, and other properties of the soil that are significant in engineering.

Maximum dry density is the maximum unit dry weight of the soil when it has been compacted with optimum moisture by the prescribed method of compaction. The moisture content that gives the highest dry unit weight is called the optimum moisture content for the specific method of compaction.

Mechanical analyses show the percentages, by weight, of soil particles that pass sieves of specified sizes. The relative proportions of the different size particles in the soil samples are determined through mechanical analysis made by a combination of sieve and hydrometer methods.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from semisolid to plastic. The liquid limit is the moisture content at which the material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Nonfarm Uses of the Soils

Table 8 sets forth the limitations of the soils of Desha County for selected nonfarm uses. The degree of limitation reflects features of the soil, generally to a depth of 6 feet, that affect a particular use. A rating of slight indicates that the limitation is not serious and is easily overcome; a rating of moderate indicates that the limitation generally can be corrected by practical means; and a rating of severe indicates that the limitation is difficult or impractical to overcome. The limitation is severe for most nonfarm uses if the site is on the unprotected side of the levees.

The nonfarm uses given in table 8 and the properties considered in evaluating the soils are discussed in the following paragraphs.

In table 8 dwellings include foundation and site requirements for homes of three stories or less, without basements. The suitability for sewage disposal is considered separately in the table. Among the soil properties that affect suitability of a site for dwellings are natural drainage, the depth to the water table, the hazard of flooding (fig. 14), the shrink-swell potential, the bearing strength, and suitability for lawns, shrubs, and trees. Ratings of bearing strength given in the table are based on estimates of the maximum load that a soil can support when compacted. Specific values should not be applied to these ratings. Shrink-swell potential refers to expansion and contraction of a soil with changes in water content.

The properties considered in rating the soils for use as septic tank filter fields were permeability, percolation rate, natural drainage, depth to the water table, and hazard of flooding. A seasonal water table at a depth of less than 4 feet constitutes a moderate to severe limitation. A percolation rate that is slower than 75 minutes per inch constitutes a severe limitation, and a rate between 45 and 75 minutes per inch a moderate limitation. Permeability at a rate of less than 0.63 inch per hour constitutes a severe limitation; at a rate of 0.63 to 1 inch per hour, a moderate limitation; and at a rate of more than 1 inch per hour, a slight limitation.

Suitability of the soils for use as sewage lagoons is influenced chiefly by such features as permeability, depth to the water table, the slope, and the hazard of flooding. Where applicable, these features are described in the table.

The properties considered in rating the soils for recreational uses were trafficability, productivity, natural drainage, hazard of flooding, and topography. Trafficability refers to pedestrian, bicycle, and light vehicular traffic. Trafficability is no more than a slight limitation on loamy soils where flooding is unlikely and where the water table is at a depth of more than 30 inches during the periods of heavy use. On clayey soils, trafficability is a severe limitation.

Figure 14.—**Flooding in an area of Perry clay used for homesites. Installation of flood-control outlets can alleviate this problem. This area is in the city of McGehee.**

The properties considered under the heading "Structures for light industry" are bearing strength, shrink-swell potential, depth to the water table, the hazard of flooding, natural drainage, topography, and corrosion potential of uncoated steel. These structures are less than three stories high.

Among the properties considered under the heading "Trafficways" are traffic-supporting capacity, topography, permeability, stability, shrink-swell potential, hazard of flooding, and depth to the water table. Traffic-supporting capacity is the ability of the undisturbed soil to support moving loads.

The information in this section can be used only as a guide for evaluating areas for the specified uses. Detailed onsite investigations are necessary, because as much as 15 percent of any given area designated on the map as a specific soil can consist of inclusions of other soils.

Formation, Classification, and Morphology of the Soils

This section discusses the factors of soil formation, the classification of the soils of Desha County by higher categories, and the morphology of the soils. Physical and chemical analyses are given for selected soils.

Formation of the Soils

Soil is formed by the interaction of climate, living organisms, parent material, and relief over a period of time. Soils vary in their characteristics as a result of significant variations in one or more of these factors (*6*).

Climate and living organisms are the active factors of soil genesis. They act on parent material and gradually change it to a natural body that has genetically related horizons. Relief modifies the effect of climate and living organisms, mainly by its influence on runoff and temperature. The parent material also affects the kind of profile that can be formed and, in extreme cases, determines it almost entirely. Finally, time is needed for changing the parent material into a soil. Usually, a long time is required for development of distinct horizons.

The interaction of the soil-forming factors is complex, and is more complex for some soils than for others. In some places one factor may dominate in the formation of the soil and fix most of its properties.

Climate

The climate in Desha County is one of hot, humid summers, mild winters, and generally abundant rainfall. It probably has not changed much during the period that the soils have been forming. The climate is uniform throughout the county and does not account for significant differences among the soils.

The warm, moist climate promotes rapid chemical reactions. Abundant rainfall makes a large amount of water available for moving dissolved or suspended material downward in the profile. In this kind of climate the remains of plants and animals decompose rapidly, and the organic acids thus produced hasten the development of clay minerals and the removal of carbonates. These soil-forming processes continue almost the year around because the soil is frozen for only brief periods in winter.

Living organisms

Among the living organisms important in the formation of soils in Desha County are bacteria, fungi, insects, and the more highly developed plants and animals. These organisms help to increase the organic-matter content and the supply of nitrogen, to diminish or increase the supply of other plant nutrients, and to change the structure or porosity of the soils.

Before settlement of the county, the native vegetation had more influence on soil development than did animal activity. The native vegetation was mostly dense hardwood forest and scattered canebrakes. Dense stands of baldcypress and water tupelo grew in swampy areas. In swales and other low and wet, but not swampy, places, the principal trees were water tupelo, sweetgum, elm, green ash, hackberry, black willow, overcup oak, and willow oak. The soils are those of the Newellton, Tunica, Sharkey, and Perry series. On slightly higher elevations and low ridges, the trees were chiefly hickory, pecan, white oak, red oak, blackgum, and elm. The soils are those of the McGehee, Hebert, Rilla, and Tutwiler series.

Through practice of farming, man has influenced soil formation. He has changed the complex community of organisms that affect soil formation by clearing forests, cultivating soils, introducing new kinds of plants, controlling floods and improving drainage, and by adding inorganic fertilizer and chemicals to control insects, disease, and weeds. Only a few results of these activities can be seen now, such as changes in structure, color, and organic-matter content of the plow layer.

TABLE 8.—*Degree and kind of*

Soil series and map symbols	Dwellings [1]	Septic tank filter fields	Sewage lagoons
Bowdre: BdU For Desha and Robinsonville parts, see their respective series.	Severe: high shrink-swell potential; seasonal high water table; ponding and somewhat poor drainage; moderate to low bearing strength.	Severe: seasonal high water table; moderately slow permeability at a depth below 18 inches.	Slight.
Bruno: BrU	Slight	Slight	Severe: sandy and loamy material; moderate permeability; poor material for reservoir sites.
Commerce: [2] CmA, CmU	Moderate: somewhat poor drainage; moderate bearing strength.	Severe: moderately slow permeability; seasonal high water table.	Slight to moderate: fair material for reservoir sites. Severe where subject to deep flooding.
Coushatta: [2] CoA	Moderate: moderate bearing strength; moderate shrink-swell potential.	Severe: moderately slow permeability.	Slight to moderate: possible moderate lateral seepage; fair material for reservoir sites. Severe where subject to deep flooding.
Desha: [2] De, Dh	Severe: high shrink-swell potential; seasonal high water table; low bearing strength; somewhat poor drainage; ponding.	Severe: very slow permeability; seasonal high water table.	Severe where subject to deep flooding; otherwise, slight.
Hebert: He	Moderate: seasonal high water table; somewhat poor drainage; moderate bearing strength.	Severe: moderately slow permeability; seasonal high water table.	Slight to moderate: fair material for reservoir sites.
McGehee: Mc	Moderate to severe: seasonal high water table; moderate bearing strength; somewhat poor drainage; high shrink-swell potential below a depth of 16 inches.	Severe: slow permeability; seasonal high water table.	Slight
Newellton: [2] NeA, NeU	Severe: high shrink-swell potential; seasonal high water table; low bearing strength; somewhat poor drainage; ponding.	Severe: moderately slow permeability below a depth of 18 inches; seasonal high water table.	Moderate: medium stability as embankment material; subject to piping at a depth below 15 inches. Severe where subject to deep flooding.
Perry: Pc, Pe	Severe: high shrink-swell potential; seasonal high water table; low bearing strength; poor drainage; ponding.	Severe: very slow permeability; seasonal high water table.	Slight

See footnotes at end of table.

limitation for nonfarm uses

Campsites	Picnic grounds	Intensive play areas	Structures for light industry [1]	Trafficways
Severe: poor trafficability; seasonal high water table.	Severe: poor trafficability.	Severe: poor trafficability; seasonal high water table.	Severe: high shrink-swell potential; moderate to low bearing strength; somewhat poor drainage; ponding; seasonal high water table; high corrosivity of uncoated steel.	Severe: seasonal high water table; low traffic-supporting capacity; high shrink-swell potential.
Moderate: fair trafficability; difficult to maintain vegetative cover.	Moderate: fair trafficability; difficult to maintain vegetative cover.	Moderate: fair trafficability; difficult to maintain vegetative cover.	Slight	Slight.
Moderate: somewhat poor drainage; seasonal high water table; moderately slow permeability.	Moderate: somewhat poor drainage.	Moderate: somewhat poor drainage; moderately slow permeability.	Moderate to severe: high corrosivity of uncoated steel; moderate bearing strength.	Moderate: moderate traffic-supporting capacity; somewhat poor drainage.
Moderate: fair trafficability; moderately slow permeability.	Slight to moderate: good to fair trafficability.	Moderate: good to fair trafficability; moderately slow permeability.	Moderate: moderate bearing strength; moderate shrink-swell potential; moderate corrosivity of uncoated steel.	Moderate: moderate traffic-supporting capacity; moderate shrink-swell potential.
Severe: fair to poor trafficability; somewhat poor drainage; seasonal high water table; very slow permeability.	Severe: fair to poor trafficability; seasonal high water table.	Severe: fair to poor trafficability; somewhat poor drainage; seasonal high water table; very slow permeability.	Severe: high shrink-swell potential; low bearing strength; seasonal high water table; somewhat poor drainage; ponding; high corrosivity of uncoated steel.	Severe: seasonal high water table; low traffic-supporting capacity; somewhat poor drainage; high shrink-swell potential.
Moderate: somewhat poor drainage; seasonal high water table; moderately slow permeability.	Moderate: somewhat poor drainage.	Moderate: somewhat poor drainage; moderately slow permeability; seasonal high water table.	Moderate to severe: seasonal high water table; moderate bearing strength; somewhat poor drainage; high corrosivity of uncoated steel.	Moderate: seasonal high water table; somewhat poor drainage; moderate traffic-supporting capacity.
Severe: somewhat poor drainage; seasonal high water table; slow permeability.	Moderate: somewhat poor drainage.	Severe: somewhat poor drainage; slow permeability; seasonal high water table.	Moderate to severe: seasonal high water table; moderate bearing strength; somewhat poor drainage; high corrosivity of uncoated steel.	Moderate to severe: seasonal high water table; moderate to low traffic-supporting capacity; high shrink-swell potential at a depth below 16 inches.
Severe: poor trafficability; somewhat poor drainage; seasonal high water table.	Severe: poor trafficability; seasonal high water table.	Severe: poor trafficability; somewhat poor drainage; seasonal high water table.	Severe: high shrink-swell potential; low bearing strength; seasonal high water table; somewhat poor drainage; high corrosivity of uncoated steel.	Severe: seasonal high water table; high shrink-swell potential; low traffic-supporting capacity.
Severe: fair to poor trafficability; poor drainage; very slow permeability; seasonal high water table.	Severe: fair to poor trafficability; poor drainage; seasonal high water table.	Severe: fair to poor trafficability; poor drainage; seasonal high water table; very slow permeability.	Severe: high shrink-swell potential; low bearing strength; seasonal high water table; poor drainage; high corrosivity of uncoated steel.	Severe: seasonal high water table; low traffic-supporting capacity; poor drainage; high shrink-swell potential.

TABLE 8.—*Degree and kind of*

Soil series and map symbols	Dwellings [1]	Septic tank filter fields	Sewage lagoons
Portland: Po, Pr	Severe: high shrink-swell potential; seasonal high water table; low bearing strength; somewhat poor drainage; ponding.	Severe: very slow permeability; seasonal high water table.	Slight
Rilla: RsA, RsB	Moderate: moderate bearing strength.	Severe: moderately slow permeability.	Slight to moderate: fair material for reservoir sites.
Robinsonville	Moderate: moderate bearing strength.	Slight	Moderate: moderate permeability; fair material for reservoir sites.
Sharkey:[2] Sh, Sm, Sr, SsA, SsU. For Commerce and Coushatta parts of Sm and for Desha part of Sr, SsA, and SsU, see their respective series.	Severe: high shrink-swell potential; seasonal high water table; low bearing strength; poor drainage; ponding.	Severe: very slow permeability; seasonal high water table.	Slight: severe in areas subject to deep flooding.
Tunica:[2] TuA, TuB, Tv	Severe: high shrink-swell potential; seasonal high water table; low bearing strength; poor drainage; ponding.	Severe: very slow permeability; seasonal high-water table.	Moderate to severe: moderate to rapid permeability at a depth below 2 to 3 feet. Severe in areas subject to deep flooding.
Tutwiler: Tw	Moderate: moderate bearing strength.	Slight	Moderate: moderate permeability to a depth of 4 to 8 feet; fair material for reservoir sites.

[1] Engineers and others should not apply specific values to estimated bearing strength.
[2] Limitations for all nonfarm uses are severe in areas not protected by levees.

Parent material

Parent material is the unconsolidated mass from which a soil forms. It determines the chemical and mineralogical composition of the soil. In Desha County all of the soils formed in alluvium deposited by the Arkansas, Mississippi, and White Rivers. This alluvium, more than 150 feet thick, is a mixture of minerals derived from many kinds of soil, rock, and unconsolidated material, including glacial drift and loess. The alluvium washed downstream from a vast area of the country reaching from the Rocky Mountains to the Appalachians. The sandy material that was deposited along the stream channels makes up the natural levees on which Bruno, Commerce, Coushatta, Rilla, Robinsonville, and Tutwiler soils formed. The clayey material that settled out some distance away from the channel on the lowest parts of the flood plains is the material in which Desha, Perry, Portland, and Sharkey soils formed. In broad transitional areas between the natural levees and the back swamps, the Bowdre, Newellton, Tunica, McGehee, and Hebert soils formed.

The simple pattern of loamy sediments near the channel and clayey sediments in the slack-water lowlands is common along the three major rivers in this county. This pattern of deposition of sediment also occurs near old, abandoned courses of the rivers, such as Bayou Bartholomew, an abandoned channel of the Arkansas River. In some places old natural levees have been cut out and clays deposited. In others, loamy sediments have been deposited on top of slack-water clay. Thus, the normal pattern of sediment distribution from a single channel has been partly or completely destroyed in many places, and beds of alluvium that have widely contrasting textures have been superimposed. Examples of this are Bowdre, Newellton, and Tunica soils, which have clayey sediments overlying loamy sediments, and Bruno soils, which have a few feet of sandy and loamy sediments overlying clay.

The manmade levees that parallel the present river channels have greatly reduced the size of the area subject to flooding.

Relief

All of Desha County is within the Lower Mississippi Valley Alluvial Plain. It is made up of parts of the flood plains of the Mississippi, Arkansas, and White Rivers, which flow together at the east-central margin of the county.

The range in relief is relatively narrow. It is characterized by wide, flat areas that are broken by gently undulating ridges and swales. Local differences in elevation are commonly less than 5 feet. The slope gradient is less *limitation for nonform uses*—Continued

Campsites	Picnic grounds	Intensive play areas	Structures for light industry [1]	Trafficways
Severe: fair to poor trafficability; somewhat poor drainage; seasonal high water table; very slow permeability.	Severe: fair to poor trafficability; seasonal high water table.	Severe: fair to poor trafficability; somewhat poor drainage; seasonal high water table; very slow permeability.	Severe: high shrink-swell potential; low bearing strength; seasonal high water table; somewhat poor drainage; high corrosivity of uncoated steel.	Severe: seasonal high water table; low traffic-supporting capacity; high shrink-swell potential.
Moderate: moderately slow permeability.	Slight	Moderate: moderately slow permeability.	Moderate: moderate bearing strength; moderate corrosivity of uncoated steel.	Moderate: moderate traffic-supporting capacity.
Slight	Slight	Slight	Moderate: moderate bearing strength.	Moderate: moderate traffic-supporting capacity.
Severe: fair to poor trafficability; poor drainage; seasonal high water table; very slow permeability.	Severe: fair to poor trafficability: poor drainage; seasonal high water table; very slow permeability.	Severe: fair to poor trafficability; poor drainage; seasonal high water table; very slow permeability.	Severe: high shrink-swell potential; low bearing strength; seasonal high water table; poor drainage; high corrosivity of uncoated steel.	Severe: seasonal high water table; low traffic-supporting capacity; poor drainage; high shrink-swell potential.
Severe: poor trafficability; poor drainage; seasonal high water table; very slow permeability.	Severe: poor trafficability; poor drainage; seasonal high water table.	Severe: poor trafficability; poor drainage; seasonal high water table; very slow permeability.	Severe: high shrink-swell potential; low bearing strength; seasonal high water table; poor drainage; high corrosivity of uncoated steel.	Severe: seasonal high water table; low traffic-supporting capacity; poor drainage; high shrink-swell potential.
Slight	Slight	Slight	Moderate: moderate bearing strength.	Moderate: moderate traffic-supporting capacity.

than 1 percent for most of the county and less than 3 percent in the gently undulating areas. A few escarpments bordering stream channels have slopes of as much as 15 percent.

Elevations range from about 125 feet above sea level at the southern county line, near Clay Bayou, to about 160 feet above sea level in the northeastern part, near Knowlton Blue Hole.

Time

The length of time required for a soil to form depends largely upon other factors of soil formation. Generally, less time is required if the parent material is coarse textured, the climate is warm and humid, and the vegetation is luxuriant. It is probable that the sediments now forming the land surface in Desha County were deposited after the advances of the Wisconsin glaciers, the last of which was retreating from the North Central States about eleven thousand years ago.

The soils of the county have been in place for only a short geological time. Probably the oldest of these soils is only a few hundred to a few thousand years old. Genetic horizons generally are faint, as in Commerce and Tutwiler soils, to moderately expressed, as in Hebert and Rilla soils. In most places the original stratification of the parent material has been but little changed by soil development. Most of the area is protected against flooding by manmade levees, but many thousands of acres in the north-central part and along the eastern margin are not protected. These unprotected areas are commonly flooded each year and receive fresh sediments with each flood.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics, assemble knowledge about them, see their relationships, and understand their behavior and their response to the whole environment.

The classification of soils into series and lower categories has been discussed in the section "How This Survey Was Made." Two systems of classifying soils above the series level have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and later revised (*5*). The system currently used (*11*) was adopted for general use by the National Cooperative Soil Survey and supplemented in March 1967 and September 1968. It is under continual study. Readers interested in the development of the system should refer to the latest literature available.

The current system consists of six categories (*4*). Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are measurable or observable, but the properties are selected so that soils of similar genesis are grouped together. Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

Table 9 shows the classification of the soil series of Desha County according to the current system. The categories are defined briefly in the following paragraphs.

ORDER.—Soils are grouped into orders according to properties that seem to have resulted from the same processes acting to about the same degree on the parent material. Ten soil orders are recognized in the current system. Of these, the Entisols, Inceptisols, Mollisols, and Alfisols are represented in Desha County.

Entisols are recent soils in which there has been little, if any, horizon development. In Desha County, the Entisols are represented by the Bruno and Robinsonville series.

Inceptisols occur mostly on young, but not recent, land surfaces. Horizons have begun to form in these soils. The Inceptisols are represented by the following series: Commerce, Coushatta, Newellton, Perry, Portland, Sharkey, and Tunica.

Mollisols have a thick, dark-colored surface layer, moderate to strong structure, and base saturation of more than 50 percent. The Mollisols are represented by the Bowdre and Desha series.

Alfisols contain accumulated aluminum and iron, have argillic horizons, and have a base saturation of more than 35 percent. The Alfisols are represented by the Hebert, McGehee, Rilla, and Tutwiler series.

SUBORDER.—Each order is divided into suborders, primarily on the basis of soil characteristics that indicate genetic similarity. The suborders have a narrower climatic range than the order. The criteria for suborders reflect either the presence or absence of waterlogging or soil differences that result from climate or vegetation.

GREAT GROUP.—Each suborder is divided into great groups on the basis of uniformity in kind and sequence of genetic horizons.

SUBGROUP.—Each great group is divided into subgroups, one representing the central (typic) concept of the group, and other subgroups, called intergrades, made up of soils that have mostly the properties of one great group but also one or more properties of another great group.

FAMILIES.—Families are established within subgroups primarily on the basis of properties important to plant growth. Some of these properties are texture, mineralogy, reaction, soil temperature, permeability, consistence, and thickness of horizons.

Morphology of the Soils

Most soil profiles contain three major horizons—A, B, and C. The A horizon is the surface layer. It can be the A1 horizon, which contains the maximum content of organic matter, or the A2 horizon, which shows maximum leaching of dissolved or suspended materials.

The B horizon is immediately below the A horizon. It contains the maximum accumulation of dissolved or suspended materials, such as iron or clay. The B horizon generally is firmer than horizons immediately above and below it and commonly has blocky structure (*16*).

Below the B horizon is the C horizon. The C horizon generally has been little affected by soil-forming processes, but it can consist of material that has been modified by weathering. In some young soils, there is no B horizon; the C horizon is immediately below the A horizon and has been slightly modified by living organisms, as well as by weathering.

The soils in Desha County have horizons that developed through one or more of the following processes: (1) accumulation of organic matter, (2) leaching of calcium carbonates and bases, (3) reduction and transfer of iron, and (4) translocation of silicate clay minerals. Most soils formed through more than one of these processes.

Accumulation of organic matter in the uppermost part of the profile to form an A1 horizon has been an important process of horizon development. The soils of this county have organic-matter content that ranges from high in Desha soils to very low in Bruno soils.

Leaching of carbonates and bases has occurred in nearly all the soils. Generally, the leaching of bases precedes the translocation of silicate clay minerals. Most of the soils are slightly to moderately leached.

Reduction and transfer of iron, a process called gleying, is evident in the poorly drained soils. The gray color in the subsurface horizons indicates the reduction and loss of iron, and the reddish-brown color of the mottles and concretions in some horizons indicates segregation of iron. Perry, Sharkey, and Tunica soils clearly show the results of gleying, which is indicated by the letter "g" in the description of soil horizons.

Translocation, or downward movement, of clay minerals has contributed to horizon development in some of the soils. Even though carbonates and other soluble salts had probably been leached from these soils to a considerable extent before translocation of clay minerals took place, the soils still contain a large amount of bases. Generally, clay has accumulated in the B horizon in the form of clay films in pores and on ped surfaces, as in Hebert and Rilla soils. This is indicated by the letter "t" in the description of soil horizons.

Physical and Chemical Analyses

Physical and chemical data resulting from laboratory analyses are useful to the soil scientist in classifying the soils. These data are helpful in estimating available water capacity, acidity, base-exchange capacity, mineralogical composition, organic-matter content, and other soil characteristics that affect management needs. The data are also helpful in developing concepts of soil formation. Laboratory data have proved helpful in rating soils for nonfarm uses, which include use for residences, industry, recreation, and transportation.

Several factors are involved in selecting soils for laboratory analysis. Soils that are extensive and most important in the survey area are considered first. A review of available laboratory data is made to determine the need for additional information on these particular soils.

TABLE 9.—*Soil series classified by higher categories*

Series	Family	Subgroup	Order
Bowdre	Clayey over loamy, mixed, thermic	Aquic Fluventic Hapludolls	Mollisols.
Bruno	Sandy, mixed, thermic	Typic Udifluvents	Entisols.
Commerce	Fine-silty, mixed, nonacid, thermic	Aeric Fluventic Haplaquepts	Inceptisols.
Coushatta	Fine-silty, mixed, thermic	Fluventic Eutrochrepts	Inceptisols.
Desha	Very-fine, mixed, thermic	Vertic Hapludolls	Mollisols.
Hebert	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols.
McGehee [1]	Fine-silty, mixed, thermic	Aeric Ochraqualfs	Alfisols.
Newellton	Clayey over loamy, mixed, nonacid, thermic	Aeric Fluventic Haplaquepts	Inceptisols.
Perry [2]	Very-fine, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols.
Portland	Very-fine, mixed, nonacid, thermic	Vertic Haplaquepts	Inceptisols.
Rilla	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols.
Robinsonville	Coarse-loamy, mixed, nonacid, thermic	Typic Udifluvents	Entisols.
Sharkey	Very-fine, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols.
Tunica	Clayey over loamy, montmorillonitic, nonacid, thermic	Vertic Haplaquepts	Inceptisols.
Tutwiler [3]	Coarse-silty, mixed, thermic	Typic Hapludalfs	Alfisols.

[1] McGehee soils in this survey are taxadjuncts to the series. Soil depth to the IIB horizon is a few inches less than the defined range for the series.

[2] Some areas of Perry soils are slightly less than 60 percent clay and, therefore, are outside the defined range for the series. These are considered taxadjuncts to the series.

[3] Tutwiler soils in this survey are taxadjuncts to the series. They have a hue of 5YR in the B and C horizons and are slightly acid or neutral in the A and B horizons. The modal soils of the series have hues of 7.5YR and 10YR, and reaction is medium acid to very strongly acid.

Generally, priority is given to soils for which little or no laboratory data are available.

In Desha County, soils of eight series were selected for analysis. Profiles of these soils are described in the section "Descriptions of the Soils." Analyses and profile descriptions for some other important soils in the county have been published elsewhere (*14*).

Soil textures given in table 10 are not necessarily the same as those stated in the section "Descriptions of the Soils," which are field estimates.

Particle-size distribution was determined by the hydrometer method (*3*). The cation-exchange capacity was calculated by summation of extractable cations. Extractable calcium, potassium, and sodium were determined by using a flame spectrophotometer. Extractable magnesium was determined colorimetrically. A buffer solution of barium chloride titrated with hydrochloric acid was used to determine extractable hydrogen. Percentages of organic matter were estimated, using the potassium dichromate-sulfuric acid digestion method. Soil reaction was determined in a 1:1 soil-water ratio with a Beckman pH meter.

General Nature of the County

This section discusses farming in Desha County, the climate, physiography and drainage, and water supply. The farming statistics used are from the 1964 Census of Agriculture.

Farming

The early economy of the county was based on cotton farming and timber industries. Later, rice, and more recently soybeans and winter small grain, have become important crops. Timber industries have greatly declined in importance as the land has been cleared for crops.

According to the 1964 Census of Agriculture, the total land area of Desha County is 496,640 acres. This acreage includes small water areas, such as streams that are less than 1/8 mile wide, and lakes and ponds that have fewer than 40 acres in surface area. About 56.2 percent of this acreage was in farms, and the remainder largely in woodland. Since then, much of the woodland has been cleared. The largest tracts that remain are in the flooded areas between the levees and the rivers.

Between 1959 and 1964 the number of farms in the county decreased from 1,252 to 829, but the average size of farms increased from 216 to 337 acres. There was a reduction in number in all size classes of farms smaller than 260 acres. The greatest reduction in number was in 10- to 49-acre farms, and the greatest increase was in 500- to 999-acre farms. In 1964, there were 146 farms 500 acres or larger in size. Of the farm operators, 291 were owners, 247 were part owners, 6 were managers, and 285 were tenants.

Most farms are small enough that the family, with occasional outside help, can do most of the work. The larger farms are operated by tenants or day laborers under the supervision of the owner or manager. Some tenants pay a fixed rent, and some pay a percentage of the crop.

Most of the farms are general farms. Cotton, soybeans, rice, and wheat are the main crops. On some farms there are fairly large herds of beef cattle. Small acreages are used to grow corn, sorghum, small grain other than rice and wheat, vegetables, fruit, and nuts. According to the U.S. Census of Agriculture, the acreage of principal crops harvested and of pasture in 1964 was as follows:

Crops	*Acres*
Soybeans	121, 533
Cotton	41, 538
Rice	13, 412
Wheat	4, 932
Hay	2, 329
Pasture	10, 210
Wooded Pasture	6, 398

TABLE 10.—*Physical and chemical*

[Analyses made by the University

Soil type	Sample number	Depth from surface	Horizon	USDA texture	Particle-size distribution— Very coarse to medium sand (2.0–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Total sand (2.0–0.05 mm.)
		In.			*Pct.*	*Pct.*	*Pct.*	*Pct.*
Commerce silt loam	S-66-Ark-21-1	0–8	Ap1	Loam	1. 2	27. 5	14. 7	43. 4
		8–14	Ap2	Silt loam	. 2	1. 8	17. 0	19. 0
		14–22	B21	Silt loam	. 4	. 5	2. 9	3. 8
		22–34	B22	Silt loam	. 1	. 7	10. 7	11. 5
		34–39	B23	Silt loam	0	1. 7	11. 9	13. 6
		39–55	C1	Silt loam	. 2	. 7	9. 5	10. 4
		55–68	C2	Silt loam	. 1	. 3	1. 3	1. 7
		68–72	Ab	Silty clay loam	. 1	. 8	1. 4	2. 3
Desha clay	S-66-Ark-21-9	0–7	Ap	Silty clay	. 2	. 5	. 7	1. 4
		7–28	B1	Clay	. 1	. 4	1. 0	1. 5
		28–44	B2	Clay	. 3	1. 0	4. 1	5. 4
		44–55	B3	Silty clay	. 6	2. 1	6. 3	9. 0
		55–72	C	Silty clay	. 6	. 7	2. 9	4. 2
Newellton clay	S-66-Ark-21-3	0–5	Ap	Silty clay	. 6	1. 0	3. 2	4. 8
		5–15	B2	Silty clay	. 3	1. 4	8. 1	9. 8
		15–22	IIB3	Silt loam	. 3	2. 9	18. 0	21. 2
		22–36	IIC1	Silt loam	. 1	. 7	23. 2	24. 0
		36–86	IIC2	Very fine sandy loam	. 2	30. 0	39. 4	69. 6
Portland clay	S-66-Ark-21-13	0–6	Ap	Clay	3. 3	3. 6	3. 8	10. 7
		6–34	B2	Clay	. 3	. 5	1. 2	2. 0
		34–52	C1	Clay	1. 9	1. 6	2. 6	6. 1
		52–72	C2	Clay loam	. 2	5. 5	23. 0	28. 7
Rilla silt loam	S-66-Ark-21-14	0–8	Ap	Silt loam	. 2	1. 2	12. 0	13. 4
		8–19	B21t	Silty clay loam	. 1	. 1	5. 1	5. 3
		19–30	B22t	Silt loam	. 1	. 1	5. 4	5. 6
		30–48	B3	Silt loam	. 1	. 1	11. 1	11. 3
		48–72	C	Silt loam	0	1. 5	30. 9	32. 4
Sharkey clay	S-66-Ark-21-4	0–5	Ap	Clay	2. 1	. 9	. 5	3. 5
		5–10	B21g	Silty clay	. 1	. 1	. 4	. 6
		10–15	B22g	Clay	. 1	. 1	. 2	. 4
		15–30	B23g	Clay	. 1	. 4	. 4	. 9
		30–80	Cg	Clay	. 1	. 4	3. 9	4. 4
Tunica clay	S-66-Ark-21-2	0–5	Ap	Clay	. 5	. 7	. 2	1. 4
		5–24	C1g	Silty clay	. 4	. 4	. 3	1. 1
		24–38	IIC2g	Silty clay loam	. 2	1. 5	1. 1	2. 8
		38–45	IIC3g	Silt loam	. 2	1. 0	12. 5	13. 7
		45–72	IIIC4	Loamy fine sand	5. 4	65. 9	14. 6	85. 9
Tutwiler silt loam	S-66-Ark-21-10	0–6	Ap	Silt loam	. 6	4. 4	23. 0	28. 0
		6–18	A2	Very fine sandy loam	. 1	3. 5	41. 6	45. 2
		18–30	B21t	Silt loam	0	. 2	31. 0	31. 2
		30–39	B22t	Loam	. 1	4. 3	36. 7	41. 1
		39–43	B3	Loam	. 1	18. 0	28. 2	46. 3
		43–50	C1	Very fine sandy loam	. 1	28. 9	37. 9	66. 9
		50–55	C2	Silt loam	0	1. 7	28. 8	30. 5
		55–72	IIC3	Silty clay	. 1	. 3	2. 1	2. 5

[1] Analyses were not made, or data were not significant.

analyses of selected soils

of Arkansas, Fayetteville]

Particle-size distribution—Continued		Extractable bases—								
Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	Potassium	Calcium	Magnesium	Sodium	Extractable hydrogen	Base saturation	Reaction (1:1 soil-water ratio)	Organic-matter content	Available phosphorus (P_2O_5)
Pct.	*Pct.*	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Meq./100 gm. of soil*	*Pct.*	*pH*	*Pct.*	*p.p.m.*
48. 5	8. 1	0. 7	8. 3	3. 0	0. 2	1. 0	92	6. 9	1. 5	44
58. 6	22. 4	. 5	11. 3	3. 5	. 2	2. 3	87	7. 3	1. 5	10
82. 1	14. 1	. 3	11. 3	3. 2	. 2	1. 8	89	7. 4	. 8	9
67. 0	21. 5	. 3	11. 8	3. 2	. 2	1. 3	92	7. 7	. 7	5
75. 8	10. 6	. 2	10. 0	2. 9	. 2	. 6	96	8. 0	. 4	4
78. 9	10. 7	. 3	11. 6	2. 6	. 2	. 2	99	8. 1	. 4	4
77. 4	20. 9	. 4	11. 3	3. 0	. 2	1. 0	94	7. 9	. 6	15
64. 3	33. 4	. 9	19. 8	5. 8	. 2	2. 3	92	7. 7	1. 0	21
49. 8	48. 8	. 9	16. 5	2. 0	. 2	6. 4	75	6. 9	3. 4	52
24. 2	74. 3	. 8	19. 9	5. 7	. 4	8. 2	77	7. 0	2. 2	18
26. 6	68. 0	. 7	15. 1	6. 5	. 8	8. 0	74	7. 0	. 6	23
47. 1	43. 9	. 5	10. 8	5. 3	. 8	5. 1	77	7. 2	. 6	12
42. 6	53. 2	. 5	11. 5	6. 3	1. 1	3. 7	84	7. 4	. 4	13
43. 5	51. 7	1. 2	18. 3	4. 6	. 2	8. 8	73	6. 4	3. 4	36
50. 0	40. 2	. 9	13. 0	4. 0	. 1	7. 9	69	6. 3	1. 4	15
57. 1	21. 7	. 6	10. 4	2. 5	. 1	4. 4	76	5. 9	. 6	17
58. 2	17. 8	. 5	9. 5	2. 3	. 2	3. 5	78	6. 0	. 4	17
21. 6	8. 8	. 2	8. 8	1. 7	. 2	2. 0	84	7. 6	. 2	7
34. 8	54. 5	. 6	8. 1	3. 4	. 4	19. 3	39	5. 5	2. 9	25
13. 3	84. 7	. 8	8. 4	2. 9	1. 5	27. 2	33	5. 3	. 7	7
17. 8	76. 1	. 7	(1)	9. 3	5. 4	1. 5	(1)	7. 5	. 6	9
32. 7	38. 6	. 4	(1)	4. 8	3. 5	1. 8	(1)	7. 6	. 3	9
74. 0	12. 6	. 4	3. 7	1. 3	. 2	3. 6	61	5. 7	. 6	64
67. 7	27. 0	. 3	4. 3	1. 3	. 3	7. 9	44	5. 0	. 3	>80
69. 0	25. 4	. 2	3. 2	1. 0	. 4	8. 8	35	4. 7	. 3	>80
71. 0	17. 7	. 2	3. 3	1. 0	. 4	4. 9	50	4. 9	. 2	>80
61. 6	6. 0	. 1	2. 3	. 7	. 2	3. 1	52	5. 2	. 1	53
37. 4	59. 1	1. 3	30. 0	5. 8	. 2	7. 1	84	7. 3	3. 8	44
45. 2	54. 2	. 9	24. 3	2. 9	. 2	6. 7	81	6. 7	1. 2	21
24. 7	74. 9	1. 0	30. 0	6. 2	. 4	9. 2	80	6. 9	2. 4	12
38. 4	60. 7	1. 0	32. 5	7. 6	. 5	5. 3	89	7. 2	1. 1	12
38. 8	56. 8	1. 2	27. 0	6. 8	. 4	6. 1	85	7. 0	. 8	17
36. 0	62. 6	1. 0	22. 5	3. 3	. 2	10. 5	72	6. 4	2. 9	34
40. 9	58. 0	. 9	19. 4	6. 9	. 3	11. 7	70	5. 7	1. 1	15
64. 1	33. 1	. 3	9. 9	4. 0	. 2	6. 6	69	6. 2	. 5	14
65. 3	21. 0	. 3	7. 8	3. 0	. 2	4. 2	73	6. 4	. 5	13
5. 3	8. 8	. 1	2. 8	1. 1	. 1	1. 9	68	6. 4	. 1	9
64. 0	8. 0	. 1	5. 0	. 9	. 2	2. 4	72	6. 5	1. 5	19
48. 9	5. 9	. 1	3. 3	. 6	. 2	1. 1	79	6. 9	. 3	40
57. 9	10. 9	. 2	3. 9	2. 1	. 3	2. 8	70	6. 7	. 3	64
48. 4	10. 5	. 1	1. 4	1. 2	. 3	3. 7	45	5. 4	. 2	20
39. 8	13. 9	. 2	2. 7	2. 6	. 3	5. 2	53	5. 7	. 2	24
27. 4	5. 7	. 1	1. 1	1. 0	. 2	1. 5	62	5. 8	. 1	10
54. 5	15. 0	. 2	3. 1	2. 3	. 4	4. 1	59	5. 8	. 1	21
51. 5	46. 0	. 6	10. 3	6. 7	. 7	6. 1	75	6. 2	. 6	11

The number of chickens in the county in 1964 was 58,711; of cattle and calves, 11,103; and of hogs and pigs, 2,076.

The larger farms are highly mechanized, and most of the smaller farms are mechanized to some extent. Most farmers use chemicals for weed control. Equipment reported on the farms in 1964 was as follows:

Equipment	*Number*
Automobiles	746
Motortrucks (including pickups)	1,156
Tractors	2,013
Grain and bean combines	351

Nitrogen is the most needed fertilizer. Phosphate and potash are also needed for most crops. There were 7,704 tons of fertilizer applied on 62,021 acres of crops in 1964.

Among the industrial enterprises related to farming are cotton ginning, grain and soybean storage, aerial crop dusting, lumber milling, well drilling, land clearing, and earth moving for land grading, drainage, and flood control.

Climate [5]

Desha County has hot humid summers, mild winters, and generally abundant rainfall. Table 11 shows data on precipitation and temperature from the U.S. Weather Bureau station at Dumas, which are representative of Desha County.

Summer is characterized by bright sunshine and high temperatures, broken by short periods of thunderstorms that may be followed by cloudy, rainy, and cooler weather. In winter, cool, cloudy, rainy weather alternates with clear, cold weather. Below-freezing periods are brief, and subzero temperatures are rare. Snowfall is negligible, and the snow usually melts within 24 hours. Sleet or freezing rain and drizzle occur only occasionally.

Precipitation generally is adequate for the needs of a farming area. It averages about 52 inches a year. Roughly 60 percent of the annual precipitation falls in winter and spring, and heavy rain is most likely in spring. There is a 90 percent chance that winter precipitation will considerably exceed 2 inches per month, and there is a 10 percent chance of more than 8 inches a month from November through May. March is consistently the wettest month; the average rainfall is nearly 6 inches. Summer rainfall from thunderheads is erratic and unpredictable.

Short periods of drought that affect small parts of the county are frequent, and summer droughts of a month or more have occurred. In some years, drought that is severe enough to injure seedlings and shallow-rooted crops occurs in April, May, and June. In most years, at least one drought that lasts 15 days or more occurs in the period June through September. Such droughts damage but do not kill the crops.

During the hottest part of the summer, evaporation of moisture from the soil averages a third of an inch a day. Drought days (days on which well-drained soils have little or no available moisture in the upper 12 inches) are most common in August, September, and October.

Thunderstorms occur on about 50 days a year, but they are not ordinarily accompanied by damaging winds. Thirty-five tornadoes have been observed in the area from 1916 through 1961.

In spring, wetness is common. In most years it interferes with spring planting. In low-lying areas planting may have to be delayed from one to several weeks in a wet season. Occasionally, late frost damages early planted crops, and they may have to be replanted. The normally dry weather in late summer and fall is favorable for harvesting, but not for fall seeding, nor for the growth of pasture plants. Rarely do frosts come early enough in fall to damage the quality or yield of crops. Fall-sown small grain remains vigorous enough for grazing throughout the winter.

The growing season is long; almost 70 percent of the year is frost free. Records from the U.S. Weather Bureau station in Dumas show that the average length of the growing season is 222 days. The average date of the last freezing temperature (32° F.) in spring is March 24, and the average date of the first in fall is November 1. The latest that a temperature of 32° has been recorded is April 19 (in 1953), and the earliest is October 6 (in 1932). The average date of the latest 28° reading in spring is March 8, and that of the first in fall is November 15. The latest that a temperature of 28° has been recorded is April 3 (in 1936), and the earliest is October 21 (in 1952).

Physiography and Drainage

Desha County is part of the flood plain of the Mississippi, White, and Arkansas Rivers. The many bayous, meanders, lakes, and swamps are evidence of previous large stream channels.

The relief of the county ranges from level to undulating; most of the area is level to nearly level. Escarpments that are 5 to 20 feet high border the network of bayous in many places.

The difference in elevation from the loamy ridgetops along the bayous to the clayey soils at a considerable distance averages about 6 inches of fall per 100 feet. The elevation ranges from about 160 feet above sea level in the northern part of the county, to about 125 feet above sea level near the southern county line.

The natural drainage is varied. Some parts of the county have fair drainage, but others are flooded a month or more during most years. Numerous bayous meander across the county. The major ones are Bayou Macon, Bayou Bartholomew, Amos Bayou, Red Fork Bayou, Boggy Bayou, Oak Log Bayou, Choctaw Bayou, Deep Bayou, Scrubgrass Bayou, and Big Bayou. Meanders of some bayous have been straightened, cleaned, and deepened to improve the drainage.

There is an intricate complex of drainage ditches in the county. Most of the major ones have recently been cleaned out, and the channels have been enlarged. This extensive system greatly improves the surface drainage of the county.

Water Supply

The supply of surface water in Desha County is good, even though some streams are dry part of the year. Among the principal streams are the Arkansas, White.

[5] ROBERT O. REINHOLD, meteorologist, U.S. Weather Bureau, Little Rock, helped prepare this section.

TABLE 11.—*Temperature and precipitation data*

[All data from Dumas, for the period 1931 through 1960]

Month	Temperature				Precipitation		
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average total	One year in 10 will have—	
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—
	°F.	°F.	°F.	°F.	Inches	Inches	Inches
January	55.7	34.8	80	10	5.47	2.02	11.08
February	58.9	37.1	82	13	4.75	2.11	8.29
March	66.0	41.1	87	22	5.66	3.02	9.77
April	75.9	51.7	90	32	5.00	1.74	8.70
May	84.0	59.9	96	45	4.55	.93	9.07
June	92.3	67.9	105	52	3.26	.57	5.99
July	94.9	71.0	106	59	4.79	1.35	8.77
August	94.9	69.9	107	56	3.08	.53	5.55
September	89.0	62.8	102	44	3.08	.64	5.77
October	79.1	51.4	95	30	2.68	.37	5.23
November	65.6	40.3	87	19	4.44	1.46	9.53
December	56.6	35.7	79	14	5.26	1.88	10.69
Year	76.1	52.0	[1] 104	[2] 12	52.02	37.38	64.30

[1] Average annual maximum.

[2] Average annual minimum.

and Mississippi Rivers, and such drainageways as Red Fork Bayou, Bayou Macon, Boggy Bayou, Amos Bayou, Bayou Bartholomew, Oak Log Bayou, Choctaw Bayou, Deep Bayou, Scrubgrass Bayou, and Big Bayou. Among the main lakes are Belcoe Lake, Kate Adams Lake, Silver Lake, and Echubby Lake. There are numerous other lakes, many of which are oxbows formed by changes in the course of the Arkansas, White, and Mississippi Rivers.

In Desha County the supply of ground water is abundant. Wells, 6 inches in diameter, that have been drilled to a depth of 90 feet supply about 1,600 gallons of good-quality irrigation water per minute.

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Board foot. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick; 144 cubic inches; 1/12 of a cubic foot.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Doyle rule. In the lumber trade, a simple method of estimating the amount of lumber that can be obtained from a small log. The footage of the length is multiplied by the diameter of the log, from which 4 inches has been subtracted. The result is then divided by 4 and squared.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Parent material. The disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod, which is an unnatural aggregate resulting from man's activity.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Taxadjunct. Soils that do not fit in a series that has been recognized in the classification system, nor are they recognized in a separate series. These soils strongly resemble soils of a recognized series, but they have one or more characteristics that are outside the range defined for the series.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Acreage and extent, table 1, page 5.
Predicted yields, table 2, page 23.
Woodland, table 3, page 24.
Wildlife, table 4, page 26.
Engineering uses of the soils, table 5, 6, and 7, pages 28 through 34.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group
			Symbol	Page	Number
BdU	Bowdre, Desha, and Robinsonville soils, gently undulating	5	---	--	---
	Bowdre part	--	IIIw-1	20	2w5
	Desha part	--	IIIw-1	20	2w6
	Robinsonville part	--	IIe-1	19	1o4
BrU	Bruno loamy sand, gently undulating	6	IIIs-1	21	2s5
CmA	Commerce silt loam, 0 to 1 percent slopes	7	I-1	19	1w5
	(In frequently flooded areas)	--	Vw-1	21	1w5
CmU	Commerce silt loam, gently undulating	7	IIe-1	19	1w5
	(In frequently flooded areas)	--	Vw-1	21	1w5
CoA	Coushatta complex, 0 to 1 percent slopes	7	I-1	19	1o4
De	Desha silt loam	9	IIIw-1	20	2w6
	(In frequently flooded areas)	--	Vw-1	21	2w6
Dh	Desha clay	9	IIIw-1	20	2w6
	(In frequently flooded areas)	--	Vw-1	21	2w6
He	Hebert silt loam	9	IIw-1	20	2w5
Mc	McGehee silt loam	10	IIw-1	20	2w5
NeA	Newellton clay, 0 to 1 percent slopes	11	IIIw-1	20	2w5
	(In frequently flooded areas)	--	Vw-1	21	2w5
NeU	Newellton clay, gently undulating	11	IIIw-1	20	2w5
	(In frequently flooded areas)	--	Vw-1	21	2w5
Pc	Perry silt loam	12	IIIw-1	20	2w6
Pe	Perry clay	12	IIIw-1	20	2w6
Po	Portland silt loam	13	IIIw-1	20	2w6
Pr	Portland clay	13	IIIw-1	20	2w6
RsA	Rilla silt loam, 0 to 1 percent slopes	13	I-1	19	2o4
RsB	Rilla silt loam, 1 to 3 percent slopes	14	IIe-1	19	2o4
Sh	Sharkey clay	14	IIIw-1	20	2w6
	(In frequently flooded areas)	--	Vw-1	21	2w6
Sm	Sharkey-Commerce-Coushatta association, frequently flooded	15	---	--	---
	Sharkey part	--	Vw-1	21	2w6
	Commerce part	--	Vw-1	21	1w5
	Coushatta part	--	Vw-1	21	1o4
Sr	Sharkey and Desha silt loams	15	IIIw-1	20	2w6
SsA	Sharkey and Desha clays, 0 to 1 percent slopes	15	IIIw-1	20	2w6
	(In frequently flooded areas)	--	Vw-1	21	2w6
SsU	Sharkey and Desha clays, gently undulating	15	IIIw-1	20	2w6
	(In frequently flooded areas)	--	Vw-1	21	2w6
TuA	Tunica clay, 0 to 1 percent slopes	16	IIIw-1	20	2w6
	(In frequently flooded areas)	--	Vw-1	21	2w6
TuB	Tunica clay, 1 to 3 percent slopes	16	IIIw-1	20	2w6
	(In frequently flooded areas)	--	Vw-1	21	2w6
Tv	Tunica clay, frequently flooded	16	Vw-1	21	2w6
Tw	Tutwiler silt loam	18	I-1	19	2o4